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BULLETIN NO. 5.

U. S. DEPARTMENT OF AGRICULTURE.

DIVISION OF AGROSTOLOGY.

(**Grass and Forage Plant Investigations.**)

A REPORT

UPON THE

GRASSES AND FORAGE PLANTS

OF THE

ROCKY MOUNTAIN REGION.

BY

P. A. RYDBERG AND C. L. SHEAR.

PREPARED UNDER THE DIRECTION OF THE AGROSTOLOGIST.



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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF AGROSTOLOGY,
Washington, D. C., November 20, 1896.

SIR: I transmit herewith for publication as Bulletin No. 5 of this division a report upon the work done in the field by Messrs. P. A. Rydberg and C. L. Shear in 1895, together with an enumeration of the plants collected by them.

Respectfully,

CHAS. W. DABNEY, Jr.,

Assistant Secretary.

F. LAMSON-SCRIBNER,

Agrostologist.

INTRODUCTION.

In June, 1895, Messrs. P. A. Rydberg and C. L. Shear were commissioned by the Secretary of Agriculture, for three months, as field agents to visit certain points in Nebraska, Idaho, Montana, Utah, and Colorado. They were instructed to collect live roots of grasses, grass seeds, and sheaves of all the species observed. They were also instructed to collect three sets of herbarium specimens of all the native grasses and forage plants found, and to gather all the information possible from stockmen and farmers relative to any and all the plants which are held to be especially valuable during drought, and also to make observations relative to the abundance and apparent value of the various grass species and the value of the regions visited for grazing or for the production of hay. The collections made by Messrs. Rydberg and Shear under these instructions were large and extremely valuable, the herbarium specimens and sheaves particularly so. Owing to the extent of territory covered and the time which it was possible to devote to actual field work, the collection of seeds was not so large as it might otherwise have been. The number of herbarium specimens amounted to over 4,000, among which was a new species of oat grass, which has been named, in honor of the Secretary of Agriculture, *Avena mortoniana*. The field notes and general observations made by Messrs. Rydberg and Shear are embodied in the following report, presented by them at the close of their season's work. To this report is appended a classified list of the grasses and forage plants collected, giving the locality and date of collection of each species. Sets of these grasses have been distributed under the numbers designated in the list, and the list will be of value to botanists in working upon the geographical distribution of plants. There will doubtless be some modifications in the names of the species of *Poa* and *Festuca* when these genera come to be more critically studied, but the determinations have been made with great care and are as exact as our present knowledge of grasses will permit. The regions visited by the agents are of particular interest to farmers, and especially to stock raisers, and any addition to the knowledge of the grasses and forage resources of this section of our country can not fail to be of value to those engaged in these pursuits.

Experiments in the cultivation of native grasses of which seeds were obtained are being made, and important and valuable results are looked for in this work. Some of the species are of particular promise, indicating productiveness and excellent quality for hay or pasturage.

Thanks are due Prof. L. H. Bailey for determining the *Carices*, to Dr. N. L. Britton for determining the other *Cyperaceæ*, to Mr. F. V. Coville for determining the *Juncaceæ*, and to Mr. C. L. Pollard for determining the *Leguminosæ*.

F. LAMSON-SCRIBNER.

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A REPORT UPON THE GRASSES AND FORAGE PLANTS OF THE ROCKY MOUNTAIN REGION.

By P. A. RYDBERG and C. L. SHEAR.

FIELD NOTES AND GENERAL OBSERVATIONS.

MONTANA.

Our observations and collections made in Montana were limited to the Beaver Head, Big Hole, Deer Lodge, Gallatin, Madison, and upper Missouri valleys.

BEAVER HEAD VALLEY.

In this valley we visited three places—Lima, Red Rock, and Dillon. At Lima the valley is about 5 miles wide. It is mostly dry, except along the Beaver Head Creek and in small areas here and there irrigated in a very primitive fashion from springs among the mountains and foothills. Very little is under cultivation, but there is much good land available for that purpose, and much could be irrigated if all the water at hand were properly used. Most of the valley is used for pasture, but on account of the dryness the grass is scanty and poor. The most common grasses were *Agropyron spicatum* S. & S., *Agropyron divergens* Nees (fig. 1), *Poa buckleyana* Nash, and *Koeleria cristata* Pers. A sedge (*Carex filifolia*) is also very common. East of the town, along the tributaries of Beaver Head Creek, there were some fair meadows. The principal grasses were *Calamagrostis neglecta* Gærtn. (fig. 2), a species of *Poa* (near *P. fendleriana*) and *Deschampsia caespitosa* Beauv.

The lands most valuable for grazing were the foothills and mountain sides, on account of the moisture from the melting snows which still remained on the higher slopes and peaks in the early part of August. The most valuable



FIG. 1.—Wire Bunch-grass
(*Agropyron divergens*).

grass here seemed to be a form of *Festuca ovina* L. In the canyons several species of *Poa* are common, and afford valuable grazing.

At Red Rock the valley is narrower and somewhat drier, there being no high mountains in the vicinity to furnish moisture as at Lima.

Only along the creek was there a good growth of grass. Near the station there was a fine meadow, the principal grass of which was a Blue-grass (*Poa* species), valuable for hay and pasturage.

At Dillon a much larger portion of the valley was under cultivation and irrigation, and some fine meadows of native and cultivated grasses were to be seen. Among the native species were *Elymus triticoides* Nutt., *Stipa comata* Trin. & Rupr., *Spartina gracilis* Trin., *Agropyron pseudorepens* S. & S., *Phalaris arundinacea* L., and *Calamagrostis neglecta* Gærtn.

BIG HOLE VALLEY.

The widest part of this valley, at least along the railroad, is at Melrose, where we were July 5-8 and August 1. On both sides of the river and along its tributaries we found good meadows.

The chief grasses were *Poa pratensis* L., *Poa nevadensis* Vasey, *Agrostis alba* L., *Koeleria cristata* Pers., and *Calamagrostis neglecta*

Gærtn. In the drier parts of the valley we also found *Bouteloua oligostachya* Torr. rather common. The hills were quite barren, scattered specimens of *Agropyron divergens* Nees, *Eriocoma cuspidata* Nutt. and *Stipa comata* Trin. & Rupr. being most common.

DEER LODGE VALLEY.

Near Silver Bow the valley is dry and barren, but toward the hills to the west, there were some meadows watered by mountain brooks. The principal grasses, which made quite an amount of hay in places, were *Deschampsia cæspitosa* Beauv., *Festuca scabrella* Torr., *Festuca rubra* L., and *Koeleria cristata* Pers.

Farther north the valley widens, so that at Anaconda it is several miles wide. From here to Deer Lodge it is well under cultivation and fine farms occur all along the road. At Deer Lodge there are good meadow lands, the chief grasses being *Festuca rubra* L., *Poa buckleyana* Nash., *Poa pratensis* L., *Agropyron spicatum* S. & S., *Beckmannia erucæformis* Host. (fig. 3), *Bromus breviaristatus* Buckl., *Calamagrostis*

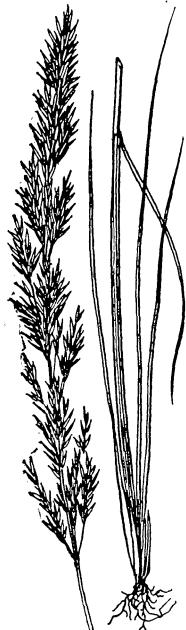


FIG. 2.—Pony-grass (*Calamagrostis neglecta*).



FIG. 3.—Slough-grass (*Beckmannia erucæformis*).

neglecta Gaertn., and several *Carices*. At Garrison the valley is very narrow, and nothing of interest was found excepting a few specimens of *Stipa richardsoni* Link.

THE UPPER MISSOURI AND MADISON VALLEYS.

These valleys may be treated here as one, the Madison being a direct continuation of the Missouri Valley. About Helena there are no natural meadows of any account. All the land under cultivation is irrigated and used chiefly by the Chinese for vegetable gardening. Most of the grasses procured were growing along streams and irrigation ditches, as the bench lands and foothills were almost destitute of forage at the time of our visit because of the dryness. The following were the most common of those noticed: *Elymus condensatus* Presl, *Agrostis alba* L., *Agropyron pseudorepens* S. & S., *Agropyron spicatum* S. & S. (fig. 4), *Puccinellia airoides* Wats. & Coul., and *Poa compressa* L.

Along the Madison and Missouri rivers there are broad valleys, the bottom lands of which are covered with the native grasses in many places, producing large crops of hay. At Townsend, in the Missouri Valley, the following grasses were most abundant: *Calamagrostis canadensis* Beauv., *Agropyron spicatum* S. & S., *Agropyron tenerum* Vasey, *Phalaris arundinacea* L., *Elymus macounii* Vasey, *Beckmannia eruciformis* Host., *Agrostis asperifolia* Trin., *Spartina gracilis* Trin., and several *Poas*.

We stopped only at one place on the Madison River, about 12 miles from its junction with the Jefferson. Here were some of the best natural meadows that we saw in Montana. The native grasses grew luxuriantly and formed a large bulk of hay which the farmers regarded as of excellent quality. The principal species were *Elymus macounii* Vasey, *Calamagrostis inexpansa* A. Gray, *Calamagrostis canadensis* Beauv., *Calamagrostis americana* Scribn., *Eatonia pennsylvanica* A. Gray, *Spartina cynosuroides* Willd., *Sporobolus asperifolius*, and *Phalaris arundinacea* L.



FIG. 4.—Colorado Blue-stem (*Agropyron spicatum*).

GALLATIN VALLEY.

The Gallatin River empties into the Missouri a few miles below the junction of the Madison and Jefferson, and here the Gallatin Valley

broadens and becomes a part of the Missouri Valley, partaking of its character and flora. Farther up the river the valley consists of bottom lands, sometimes of considerable extent, forming natural meadows from which the bulk of the hay is obtained, and bench lands constituting

the greater portion of the valley. These bench lands are under cultivation, being well irrigated by water from the Gallatin and its branches. The native grasses of the "benches" are principally Blue Grama, *Bouteloua oligostachya* Torr. (fig. 5), *Poa buckleyana* Nash, and the Sheep Fescue, *Festuca orina* L. In an oat field near Manhattan there was fully as much *Eriocoma cuspidata* Nuttall, as oats, and a neglected field close by was completely covered with the same grass. A field of potatoes was also overrun with it. In sandy soil similar to that of the bench lands there seems to be danger of this grass becoming a bad weed. The chief grasses of the river bottoms were *Agrostis scabra* Willd., *Agropyron pseudorepens* S. & S., *Koeleria cristata* Pers., *Agropyron caninum* R. & S., *Calamagrostis canadensis* Beauv., *Calamagrostis inexpansa* A. Gray, *Deschampsia caespitosa* Beauv., *Bromus cilatus* L., *Spartina gracilis* Trin., and *Eatonia pennsylvanica* A. Gray.

At Bozeman the valley is under good cultivation and the foothills and mountain sides furnish excellent pasture. The most important grasses in such situations, besides the grama and bunch grasses, are *Agropyron divergens* Nees, *Trisetum subspicatum* P. B., *Bromus breviaristatus* Buckl. (fig. 6), and *Danthonia californica* Boland. The most common grasses of the mountain meadows and in the canyons are *Melica subulata* Scribn., *Melica spectabilis* Scribn., *Melica bulbosa* Geyer, *Phleum alpinum* L., *Deschampsia elongata* Munro, *Festuca jonesii* Vasey, *Poa nemoralis* L., and *Poa wheeleri* Vasey.



FIG. 5.—Blue Grama (*Bouteloua oligostachya*).

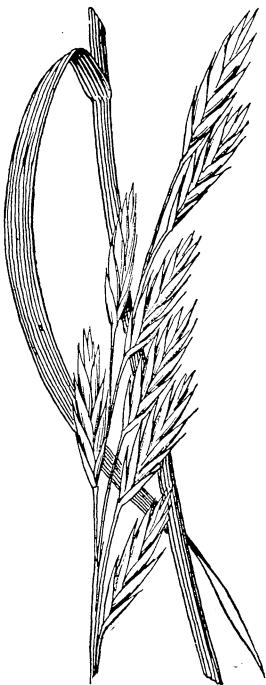


FIG. 6.—Mountain Brome-grass (*Bromus breviaristatus*).

IDAHO.

The only place visited in this State, was Beaver Canyon, which is in the mountains near the continental divide. The character of the flora is chiefly subalpine. There were a few good meadows along the mountain streams; one especially, produced a large crop of excellent hay. The chief grass was *Alopecurus occidentalis* Scribn. There was also a considerable quantity of *Trifolium longipes* Nutt., which added much to the quantity as well as the quality of the hay.

The following grasses were frequent or common in meadows and along streams: *Poa pratensis* L., *Poa wheeleri* Vasey, *Poa nemoralis* L., *Poa buckleyana* Nash, *Calamagrostis suksdorffii* Scribn., *Agropyron caninum* R. & S., *Agropyron spicatum molle* Scribn. & Smith, *Danthonia intermedia* Vasey, *Bromus breviaristatus* Buckl., *Koeleria cristata* Pers., *Agrostis asperifolia* Trin., *Hordeum nodosum* L., and *Festuca ovina* L. Here as elsewhere *Poa buckleyana* and *Festuca ovina* were the chief grazing grasses and constituted the principal part of the pasturage of the sheep ranges in the vicinity.

UTAH.

Only three days were spent in Utah, two at Logan and one at Echo. In the vicinity of the agricultural experiment station at Logan native grasses were not abundant.

Experiments were being carried on with the cultivated varieties of grasses, and we were told that they had once attempted to cultivate one of the "bunch grasses," a species of *Agropyron*, but it was a failure. Instead of producing the tall leafy form of its wild state it was low and stunted. Perhaps this was because it is not the habit of the plant to form a continuous sod, and when compelled to spread out and abandon its bunching habit it lost its thrifty character. This gives a hint, however, as to the necessity of careful experiments in the cultivation of the native species before definite statements can be made as to their value under changed conditions. The following wild species were common: *Trisetum subspicatum* P. B., *Agrostis asperifolia* Trin., *Stipa viridula* Trin. (fig. 7), *Bromus kalmii* A. Gray, and *Avena fatua* L. The last species is looked upon here as a bad weed.



FIG. 7.—Feather Bunch-grass (*Stipa viridula*).

COLORADO.

The larger part of the month of August was spent in Colorado visiting Clear Creek Canyon about Georgetown, Silver Plume, Gray's Peak, and Idaho Springs. Our work was not confined to the canyon and its branches, but much collecting was done on the mountain sides and in a few instances even above timber line.

The canyon is narrow and gives but little place for natural meadows. There is one of some extent, however, just below Georgetown, where the valley is widest. This was mostly used as pasture for the donkeys and village cows. Along Clear Creek were found *Poa flava* Linn.,

Beckmannia eruciformis Host., *Calamagrostis neglecta* Gärtn., *Calamagrostis inexpansa* A. Gray, and *Agrostis alba* L., but most of the grasses consisted of shorter species, as *Sporobolus depauperatus* Scribn., *Bouteloua oligostachya* Torr., *Koeleria cristata* Pers., *Alopecurus occidentalis* Scribn., and *Poa alpina* L. In a valley 3 miles north of Georgetown, near Empire, was found the only meadow we saw that could be used as hay land. The most common species here were *Danthonia parryi* Scribn., *Poa pratensis* L., *Muhlenbergia gracilis* Trin., *Elymus triticoides* Nutt., *Agropyron pseudorepens* S. & S., *A. spicatum molle* Scribn. & Smith, and *Koeleria cristata* Pers. (fig. 8).

Hay land is scarce in the region about Georgetown and Silver Plume, but the valleys, canyons, and mountain sides furnish some pasture. The grass flora is especially rich along the mountain brooks. The genus *Poa* is well represented and numerous species, varieties, and forms are met with almost everywhere. Other common grasses are *Agropyron pseudorepens* S. & S., *Calamagrostis canadensis* Beauv., *Calamagrostis purpurascens* R. Br., *Festuca ovina* L. (several forms), *Bromus ciliatus* L., *Bromus ciliatus purgans* A. Gray, *Trisetum montanum* Vasey, *Trisetum subspicatum* P. B., and *Phleum alpinum* L. To these might be added several species of *Carex* which furnish indifferent forage.

In the vicinity of Idaho Springs, which is situated at a considerably lower altitude, we found many of the species just mentioned and several not found in the higher mountains, as, for instance, *Cinna pendula* Trin., *Stipa robusta* Scribn., *Sitanion elymoides* Rafin., and *Melica parviflora* Scribn.

FOOTHILLS AND PLAINS.

We spent two days at Golden and one day each at Mountain Meadow, Boulder, and La Salle. The first three places are situated at the base of the mountains and the last on the plains. Our collections at the

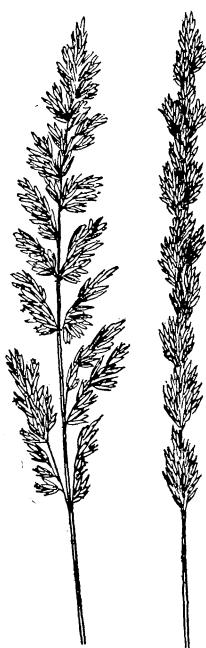


FIG. 8.—Prairie June-grass
(*Koeleria cristata*).

former places were made partly in the foothills and partly on the plains. The most important grasses of the foothills were the following: *Muhlenbergia racemosa* (Mx.) B. S. P., *Muhlenbergia gracilis* Trin. (fig. 9), *Andropogon scoparius* Mx., and *Andropogon provincialis* Lam., with other common species characteristic of the plains. The plains of Colorado, as well known, are very dry and the vegetation is scanty except where irrigated. The grasses are essentially the same as in western Nebraska.

NEBRASKA.

In this State the following places were visited: Central City, Kearney, and North Platte. At North Platte *Sporobolus airoides* Torr. was very common. Dr. Vasey has reported this as a valuable grass, but this is evidently a mistake, as the species is very tough and wiry and must make very poor hay, while as pasture it is apparently untouched by stock as long as there is anything else to be found. In a large pasture, which had apparently been in use from the opening of the season, every bunch of this grass had been left untouched, while the other grasses were cropped close to the ground.

GRASSES DESERVING SPECIAL MENTION.

The following species, from what we observed and from what we could learn of farmers and ranchmen, appear to be of most importance in the region visited:

Alopecurus occidentalis Scribn. This grass somewhat resembles timothy, though not so stout. In very wet meadows it grows tall and thick, producing a large quantity of excellent hay. It is a grass well worthy of attention.

Agropyron richardsoni Schrad. In a natural meadow on the river bottom at Manhattan, Mont., a form of this species was very abundant. It was tall and leafy, and grew very thick on the ground, making a large quantity of excellent hay. It impressed us as being a most excellent grass for river bottoms and irrigated land.

Agropyron spicatum Scribn. & Smith. This is generally regarded as being a very good grass. It does not produce as much hay as many species, but is thought to make up in nutritive qualities what it lacks in bulk. It endures dry weather better than many species, and affords good pasture on some of the bench lands.



FIG. 9.—Slender Satin-grass (*Muhlenbergia gracilis*).

Agropyron pseudorepens Scribn. & Smith. The plants referred to this species are undoubtedly indigenous in this region, and appear quite different in habit from the European *A. repens* Beauv., introduced into the Eastern States. It spreads little by its rootstocks as compared with the latter. It has been suggested that this is on account of its not occupying broken land, and that when given cultivated ground it would assume the same habit as the other. However this may be, our observations of the plant lead us to believe that this species should be tried under cultivation in the West. Under favorable conditions this grass grows tall and very leafy and without the wiry character of the much-despised "Quack."



FIG. 10.—Early Bunch-grass (*Eatonia obtusata*).

Agrostis asperifolia Trin. There are forms of this plant that vie in abundance and vigor with the last mentioned. They grow in similar situations and are valuable grasses.

Agrostis scabra Willd. Forms of this well-known grass are worthy of more attention in this region. In some low meadows we found it producing abundantly. A grass referred doubtfully to this species was abundant in an irrigated natural meadow at Melrose, Mont., and furnished a large amount of fine hay. The grass seems

to be a most excellent one

where plenty of moisture can be secured.

Agrostis alba L. In several places more thrifty and luxuriant forms of this species were observed than we had ever noticed before. This was perhaps owing to the peculiar fertility of the soil. However this may be, such forms are worthy of attention and may be taken as starting points for improved varieties.

Bouteloua oligostachya Torr. (See fig. 5.) It is hardly necessary to speak of this well-known species, with whose merits most people are familiar. It is one of the best pasture grasses of the arid plains and bench lands of the West, and far excels, in general opinion, the true Buffalo-grass, *Bulbilis dactyloides* (Nutt.) Rafin., which has gained much of its credit at the expense of *Bouteloua*, the two being often confused by farmers and ranchmen. Under favorable circumstances it produces a much larger crop than is usually supposed.

Calamagrostis canadensis Beauv. Some very excellent forms of this were seen in meadows. It is no doubt a good hay grass.

Calamagrostis inexpansa A. Gray. This species, though not very abundant, seems capable of producing a good quantity of fair hay.

Calamagrostis neglecta Gaertn. A variety of this species was found which seemed capable of producing a fair crop of good hay.

Deschampsia cæspitosa Beauv. In several very wet places we saw forms of this grass which produced a great bulk of hay of fair quality.

Eatonia obtusata A. Gray. (Fig. 10.) This and the next species are generally regarded in the East as of little or no agricultural value, but some forms noticed in meadows in the Gallatin Valley produced quite a bulk of the hay.

Eatonia pennsylvanica A. Gray. In a meadow at Bozeman, Mont., a thrifty form of this is regarded as a fair hay grass. In this connection it is well to note that quite a number of grasses, usually of little or doubtful value in the Eastern States, were here more thrifty, possessing characters which led us to regard them as worthy of attention in this region.

Elymus canadensis L. (Fig. 11.) A prominent sheep raiser in Kearney County, Nebr., says this is a valuable grazing grass in the sand hills. It also makes fair hay if cut before it gets too old.

Elymus triticoides Nutt. This was about the only grass seen among the very arid Alkaline bluffs about Green River, Wyoming. It is a bunch grass and must furnish quite a little forage in such localities.

Festuca ovina L. This grass in its several varieties is the most abundant and perhaps the most valuable one of the foothills. It is considered very nutritious and furnishes the greater part of the winter grazing.

Festuca rubra L. In some places in Montana this is a common species. It frequents moist meadows. At Bozeman it was common in the meadows of the experiment station, and was regarded as a good hay grass.

Festuca scabrella Torr. This is another "Bunch-grass" of great value which is found growing in similar situations as the last, but not so common.

Koeleria cristata Pers. Many of the Montana specimens referred to this species are so different in habit and general appearance from

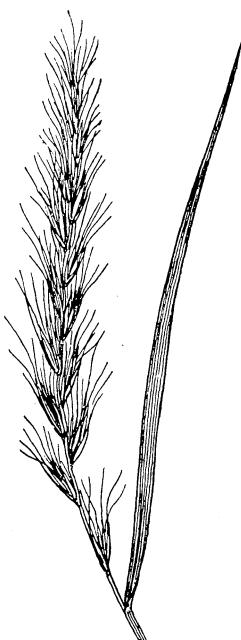


FIG. 11.—Wild-rye (*Elymus canadensis*).

the ordinary forms of the plains that it is difficult for one to be convinced that they are all the same species. A form growing in the drier parts of a poorly irrigated meadow at Melrose, Mont., especially attracted our attention. It grew very thick on the ground, forming a very dense sod, and reached a height of from 2 to 3 feet, producing a large quantity of excellent hay.

Festuca kingii Scribn. (Fig. 12.) This species, which is a "Bunch-grass," was observed at only one place, Lima, Mont., high up in the foothills at an altitude of between 7,000 and 8,000 feet. It is a very robust species, resembling in habit *Festuca scabrella* and produces a large quantity of good, though rather coarse winter forage. It might prove of value for hay under cultivation in similar localities.



FIG. 12.—King's Fescue (*Festuca kingii*).

Poa laevigata Scribn. We found this grass at only two localities—Green River, Wyoming, and Lima, Mont.—and not common at either place. At Green River it grew in alkaline soil along the river and had the appearance of an excellent grass for agricultural purposes.

Poa wheeleri Vasey (No. 297 Shear). This grass, which was collected in the mountains at Beaver Canyon, Idaho, June 27, seemed to have agricultural value.

Poa nevadensis Vasey. This is another excellent species of much promise for cultivation.

Poa pratensis L. A grass (No. 360 Shear) referred to this species was found abundant in an irrigated natural meadow at Melrose, Mont. It was one of the finest meadow grasses we saw, pro-

ducing a large quantity of most excellent hay. It seemed superior to any cultivated form of the plant.

Poa sp. near *P. buckleyana* Nash. At Red Rock, Mont., we saw a meadow almost entirely occupied by this grass. It produced a fair quantity of good hay, though apparently not growing under the most favorable circumstances of soil and moisture.

Poa flava L. This species was frequently met with in meadows and as is well known is an excellent grass (*Poa serotina* Ehrh.).

Poa subaristata Vasey. A large part of the forage in some of the higher foothills, especially at Lima, Mont., is made up of this grass. It is evidently a valuable forage plant.

Poa buckleyana Nash. This, with the last-named species, which is less common, forms a large portion of the pastureage on the bench lands and in the foothills, and is an excellent species for both summer and winter grazing. It is one of the most valuable "Bunch-grasses" of the region.

MISCELLANEOUS PLANTS.

In addition to the above grasses we noticed a few other forage plants which gave indication of possible value for cultivation. Two native clovers—*Trifolium beckwithii* Brewer, and *T. longipes* Nutt.—were quite abundant in some wet meadows and added considerably to the bulk of hay. There were several other leguminous plants of possible value, such as *Astragalus adsurgens* Pall., *A. mortoni* Nutt., and *Thermopsis montana* Nutt. (fig. 13), which is said to be eaten by stock when not allowed to get too old before cutting.

In the above list we have not attempted to mention all the grasses of the region that have agricultural value, but only those that appeared to us to be most likely to repay careful investigation and trial under various conditions of climate and cultivation.

HAY-PRODUCING GRASSES.

Phalaris arundinacea L. Reed Canary-grass. Fair.

Stipa comata Trin. & Rupr. Needle and Thread. Sometimes cut for hay when young.

Stipa viridula Trin. Feather Bunch-grass.

Alopecurus occidentalis Scribn. Mountain Foxtail. Valuable in wet mountain meadows.

Agrostis alba L. Red-top. Introduced.

Agrostis asperifolia Trin. Rough-leaved Bent. Valuable.

Calamagrostis canadensis Beauv. Blue-joint. One of the best species.

Calamagrostis canadensis acuminata Vasey. Appears to be an excellent hay grass.

Calamagrostis macouniana Vasey. Small-flowered Blue-joint. Valuable.

Calamagrostis americana Scribn. American Blue-joint. Valuable.

Deschampsia cespitosa Beauv. Tufted Hair-grass. A valuable species.

Spartina cynosuroides Willd. Fresh-water Cord-grass. Good when cut young.

Spartina gracilis Trin. Slender Cord-grass. Said to be good if cut when young.

Bouteloua oligostachya Torr. Blue Grama. In wet meadows it sometimes becomes 2 to 3 feet high, and then makes excellent hay.



FIG. 13.—Montana Bush-pea (*Thermopsis montana*).

Beckmannia eruciformis Host. Slough-grass. Of some value in wet meadows.
Eatonia obtusata A. Gray. Eaton's grass. Fairly good.

Eatonia pennsylvanica A. Gray. Valuable.

Poa flava Linn. False Red-top. Excellent.

Poa lavigata Scribn. (*Poa lavis* Vasey.) Good.

Poa nevadensis Vasey. Nevada Blue-grass. One of the best species of the mountain meadows. Where abundant it makes good hay, and apparently deserves to be given a trial in cultivation.

Poa pratensis L. Kentucky Blue-grass. Excellent.

Panicularia aquatica (J. E. Smith) Kuntze. Reed Meadow-grass. Fair.

Festuca rubra L. Red Fescue. Valuable.

Festuca scabrella Torr. (fig. 14). Great Bunch-grass. A valuable species.

Bromus inermis Leyss. Awnless Brome-grass. Withstands long droughts. Introduced.

Elymus canadensis L. Canada Lyme-grass or Wild-rye. Hay of good quality, but coarse. The heads are often affected with ergot, and when so diseased are dangerous when fed to stock.

Agropyron spicatum Scribn. & Smith. Blue Stem. One of the best grasses in wet meadows (Nebraska and Montana).

PASTURE GRASSES.

Stipa comata Trin. & Rupr.

Muhlenbergia gracilis Trin.

Bouteloua oligostachya Torr. Blue Grama. An exceedingly valuable species.

Bulbilis dactyloides Rafin. Buffalo-grass. Excellent, but its value has probably been overestimated.

Koeleria cristata Pers. Prairie June-grass. Excellent for early pasture (Nebraska).

Poa arida Vasey. Mountain Blue-grass. One of the best species for early pasturage.

Poa buckleyana Nash. In Idaho furnishes a large per cent of the pasturage. One of the best "Bunch-grasses."

Poa compressa L. Canadian Blue-grass. Excellent.

Poa lucida Vasey. Good.

Poa wheeleri Vasey. Valuable, and in good soil an excellent hay grass.

Festuca ovina L. Sheep's Fescue. An excellent species. Furnishes a large amount of spring and winter forage.

FORAGE PLANTS OTHER THAN THE GRASSES.

LEGUMINOSÆ.

Astragalus adsurgens Pall. Buffalo-pea. Of some value on the ranges.

Thermopsis montana Nutt. Montana Bush-pea. Eaten by stock, and where abundant makes good hay.

Trifolium longipes Nutt. Rocky Mountain Clover. "I consider this an excellent forage plant" (Shear).

APOCYNACEÆ.

Apocynum cannabinum L. Dog Bane. Said to be eaten by stock when cured with grass.



FIG. 14.—Buffalo Bunch-grass
(*Festuca scabrella*).

CHENOPODIACEÆ.

Eurotia lanata L. (fig. 15). Winter Fat. A very valuable winter forage, especially for sheep.

JUNCACEÆ.

Juncus balticus Willd. and *J. xiphiooides montanus* Engelm. Rush. Constitutes a small part of the hay cut in wet places.

CYPERACEÆ.

Eleocharis palustris R. & S. Common Spike-rush. In many places constitutes the bulk of the hay.

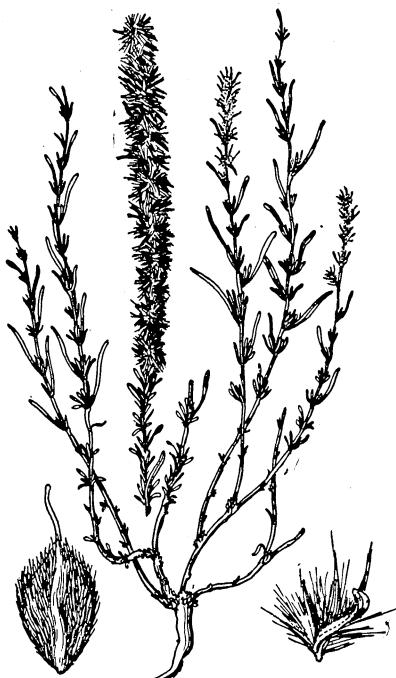


FIG. 15.—Winter Fat or Sweet Sage (*Eurotia lanata*).

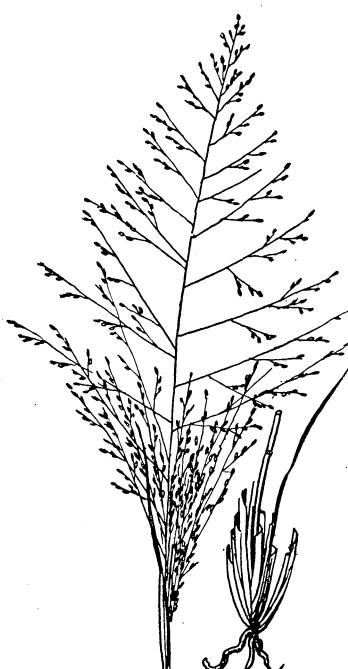


FIG. 16.—Salt-grass (*Sporobolus airoides*).

Carex festiva Dewey. Sedge. In Idaho this forms a considerable portion of the hay cut in wet meadows.

Carex marcida Boott. Sedge. Abundant in alkaline meadows, forming in some places the bulk of the hay.

Carex variabilis Bailey? Sedge. Constituting the bulk of the hay in places (Bozeman, Mont.).

EQUISETACEÆ.

Equisetum laevigatum A. Br. Mare's Tail. In many places regarded as a good hay plant, and is said to be especially liked by horses.

CHARACTERISTIC GRASSES OF DIFFERENT SOILS OR STATIONS.

In respect to location the principal grasses of the bottom and lower bench lands were *Agropyron spicatum*, *Elymus condensatus*, *Poa buckleyana*, *Koeleria cristata*, *Stipa viridula*, *Bouteloua oligostachya*, and *Calamagrostis inexpansa*.

Growing in sandy soil: *Eriocoma membranacea* and *Calamovilfa longifolia*.

Growing in alkaline soil: *Distichlis spicata*, *Puccinellia airoides*, *Sporobolus airoides* (fig. 16), and *Sporobolus asperifolius*.

Growing in low grounds and along creeks: *Beckmannia eruciformis*, *Catabrosa aquatica*, *Panicularia aquatica*, *Panicularia nervata*, *Poa flava*, and *Alopecurus geniculatus*.

Growing on the foothills and mountain slopes: *Festuca scabrella*, *Festuca orina* and *Festuca rubra* in several forms, *Danthonia intermedia*, and several species of *Poa*.

AN ENUMERATION OF THE PLANTS COLLECTED, WITH ECONOMIC NOTES.

EQUISETACEÆ.

Equisetum laevigatum A. Br.

Montana: Melrose, common, forming a small portion of the hay in wet meadows; by many this is regarded as a good hay plant; said to be especially relished by horses; July 6 (341,¹ 2094).

GRAMINEÆ, Grasses.²

Andropogon nutans avenaceus Hack.

Colorado: La Salle, September 4 (2513).

Nebraska: North Platte, September 5 (2515).

Andropogon hallii grandiflorus var. nov.

Colorado: Mountains near Golden, August 30 (747), and in the foothills near Meadow Park, August 15 (605, 2366). A robust variety with the hairs of the rachis and pedicels yellow, spikelets 6 to 7 lines long, the second glume only being pilose on the keel near its apex. A subvariety of *A. hallii flaviolus* Hack.

Andropogon provincialis Lam.

Nebraska: Abundant in meadows along the North Platte River, September 6 (768).

Colorado: Hills near Golden, not common, August 30 (2499).

Andropogon scoparius Michx.

Nebraska: Common on the prairies and bluffs, September 5 (769, 2517).

Colorado: Meadow Park, frequent in rocky places in the foothills, August 15 (601); Golden, common in Clear Creek Canyon, August 30 (749, 750); Boulder, September 3, (762).

Panicum capillare L.

Nebraska: Central City, June 19 (264, 2011), abundant in sandy pastures along the Platte River, and affording a poor quality of forage when young.

Colorado: Golden, not common, August 29 (755, 2505).

Utah: Logan, August 9.

Panicum capillare brevifolium Vasey in Herb.

Culms tufted, low, 6 inches or less, bearing two or three short and broad leaves; primary panicle-branches nearly horizontal, few-flowered; spikelets acute, 1½ lines long, the acute first glume about one-half the length of the subequal second and third.

Montana: Manhattan, on a shaded sand bar in the Gallatin River; rare; July 19, 436. Also represented in the National Herbarium by a specimen from Washington.

Panicum crus-galli muticum Vasey.

Colorado: Meadow Park, frequent in moist ground, August 15 (602); Golden, growing in water and cultivated fields, August 29 (753, 2502, 2503).

¹Numbers 251 to 772 were collected by Mr. C. L. Shear, and numbers 2001 to 2523 were collected by Mr. P. A. Rydberg.

²Determined by F. Lamson-Scribner.

Panicum virgatum Linn.

Nebraska: North Platte, abundant in meadows along the river, September 5 (767, 2516).

Colorado: Meadow Park, August 15 (606); Golden, common, August 29 (756, 2508); La Salle, common, September 3 (2512).

Chætochloa viridis (Linn.) Scribn. (*Setaria viridis* Beauv.).

Nebraska: Central City, a common weed along roadsides and borders of meadows, June 19 (262, 2009).

Chætochloa italicica (L.) Scribn. (*Setaria italicica* Kth.).

Colorado: Idaho Springs, scarce, August 29 (746).

Cenchrus tribuloides L.

A dark-green, lax, leafy form, with slender bristle-like spines.

Nebraska: Central City, common, and a great pest, June 19 (257, 2015).

Homalocenchrus oryzoides Mieg. (*Leersia oryzoides* Sw.).

Nebraska: North Platte, meadow near Fremonts Slough, September 7 (772, 2523).

Phalaris arundinacea Linn. (fig. 17).

Nebraska: Central City, not common, June 19 (261).

Montana: Dillon, rather common on the banks of streams, July 3 (339, 2089); Townsend, common in the meadows, a good hay grass, July 16 (2166); Manhattan, common in moist thickets and shady meadows, July 17 (425).

Phalaris canariensis Linn.

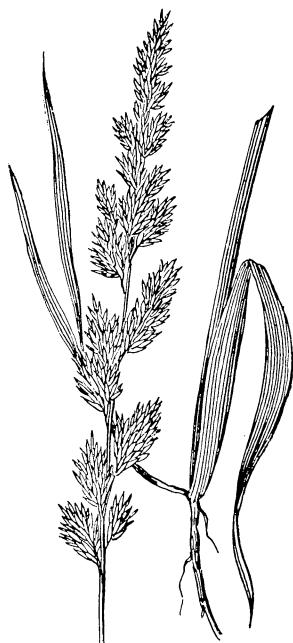
Nebraska: Near a refuse heap on the river bank, Kearney, June 20 (269).

Savastana odorata (Linn.) Scribn. (*Hierochloë borealis* R. & S.).

Montana: Manhattan, here and there in the woods and on sandy river banks, July 17 (437, 2184); Logan, rare, moist thickets, July 27 (2511).

Idaho: Beaver Canyon, scarce; moist shady meadows and along small streams, June 26, 27 (306, 2060).

FIG. 17.—Reed Canary-grass (*Phalaris arundinacea*.)

**Aristida fasciculata Torr.**

Nebraska: North Platte, common on the prairies near the bluffs, of no economic value, June 22 (279, 2025).

Stipa comata Trin. & Rupr. (fig. 18).

Nebraska: North Platte, the common bunch-grass on the bluffs along the Platte, June 22 (278, 2024).

Montana: Dillon, common in a dry meadow, July 3 (334, 2078); Manhattan, stony hillsides and cultivated fields, July 17 (350, 433, 2195).

Stipa richardsoni Link.

Montana: Silver Bow, wooded hillsides, not common, July 8 (357, 2109); Garrison, occasional along the river, and among bushes near the railroad, July 10 (371, 2125).

Stipa scribnieri Vasey.

Colorado: Georgetown, occasional on mountains, August 1 (641); Golden, here and there in Clear Creek Canyon, August 29 (2507).

Stipa spartea Trin.

Colorado: Georgetown, frequent on mountain sides, August 19 (636).

Stipa viridula Trin.

Montana: Dillon, on the prairies, but rather local, may be a good hay grass when cut early, July 3 (2087); Gallatin, meadows, where common it makes fair hay, July 16-29 (528, 2180, 2285); Manhattan, frequent in moist, shady places, July 17 (413).

Stipa lettermani Vasey.

Montana: Lima, canyon and mountain sides, August 5 (595, 2302).

Idaho: Beaver Canyon, not common in the meadows, August 7 (2343).

Stipa robusta (Vasey) Scribn. (*S. viridula robusta* Vasey).

Colorado: Idaho Springs, common, August 27, 28 (725, 2493, 2489), a lax-panicked form; Georgetown, mountain sides, frequent, August 1 (639).

Idaho: Beaver Canyon, frequent, dry mountain sides, June 27 (301) and August 7 (2345).

Eriocoma cuspidata Nutt.

Wyoming: Wamsutter, frequent along the railroads, June 24 (2814); Green River, only a few specimens in the valley, June 25 (2035).

Colorado: Georgetown, frequent on mountain sides, August 19 (644).

Montana: Melrose, stony hillsides, affording some pasturage, July 6 (349); Manhattan, abundant in neglected cultivated fields, July 17 (432, 2194).

It is said by some to make good hay, but it is apparently a great pest, as it has taken possession of nearly a section of neglected irrigated bench land, and in one or two oat fields this species has taken more than half the ground.

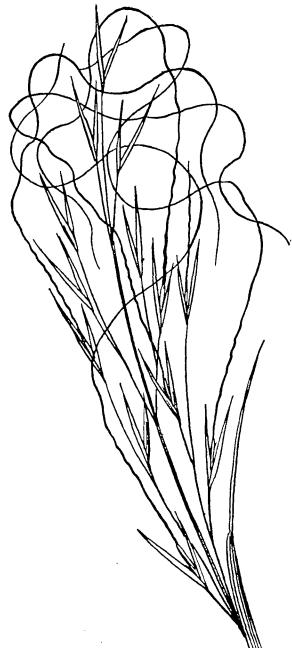


FIG. 18.—Needle and Thread (*Stipa comata*.)

Oryzopsis micrantha Thurb.

Colorado: Meadow Park, scarce, in the foothills on rocks, August 15, 29 (599, 744).

Muhlenbergia racemosa (Mx.) B. S. P. (*M. glomerata* Trin.).

Nebraska: Central City, scarce along the river bank, June 29 (527).

Colorado: Meadow Park, frequent in rocky places in the foothills, August 15 (600); Golden, in Clear Creek Canyon, August 29, 30 (754, 2506); Boulder, September 3 (761).

Montana: Gallatin, along the railroad, July 29 (527, 2286).

Muhlenbergia gracilis (HBK.) Trin.

Colorado: Meadow Park, common in dry places in the foothills, perhaps a valuable pasture grass, August 15 (598, 2361); Idaho Springs, hillsides, a large form with comparatively broad leaves and many-flowered, rather dense panicles, August 29 (2494); Boulder, foothills, September 3 (759, 2510); Georgetown, common, August 19 (632, 643, 2399, 2403); Georgetown, frequent in a meadow, August 19 (632).

***Lycurus phleoides* HBK.**

Colorado: Meadow Park, a bunch-grass, rather common on the foothills, August 15 (604, 2363).

***Alopecurus geniculatus fulvus* (J. E. Smith) Scribn.**

Colorado: Georgetown, margins of streams, common, a large leafy form with spikes 3 inches long, August 17 (616, 2389).

Wyoming: Green River, common near the river, affording a little pasturage, June 25 (285, 2029).

Montana: Bozeman, in wet gravelly soil, Bozeman Canyon, July 22 (498, 2222); Dillon, July 3 (337); Red Rock, along streams, July 2 (328); Logan, July 27 (508).

Idaho: Beaver Canyon, June 26 (296).

***Alopecurus occidentalis* Scribn.**

Montana: Deer Lodge, very rare, along the shady margins of a brook, July 10 (352, 2115).

Idaho: Beaver Canyon, common in wet meadows, a good hay grass adapted to such situations and probably worthy of cultivation, June 26 (291), and (2054) a form with rather small spikelets.

***Phleum alpinum* L.**

Colorado: Silver Plume, frequent along streams, altitude 13,000 feet, August 24 (678, 707, 2468); Georgetown, along the creek, very local, August 17 (2383).

Montana: Lima, along the margins of a mountain stream, August 6 (555, 2311); Bozeman, shady banks of Mystic Lake, July 25 (494, 2249).

***Phleum pratense* L.**

Nebraska: Central City, June 17 (258, 2005).

Montana: Deer Lodge, July 9 (2132); Manhattan, July 17 (414); Townsend, scarce in meadows and along roadsides, a form with short spikes and longer awned empty glumes approaching *P. alpinum*, the whole plant somewhat glaucous, culms about 1 foot high, July 16 (434); Helena, in woods near the Warm Springs, July 13 (2140),

spikes like those of No. 434, but the plant laxer and greener, "seems to be intermediate between *P. alpinum* and *P. pratense*" (Rydberg.)

***Sporobolus airoides* Torr.**

Nebraska: North Platte, very common in meadows, forming large patches, too tough and wiry to be of value for pasturage, June 21 (273, 2020).

Montana: Dillon, July 3 (2077); Melrose, scarce in dry meadows and pastures, July 6 (346); Townsend, abundant in drier meadows, in some places constituting half the grass, July 15 (396, 2155).

***Sporobolus asperifolius* (Nees & Meyn.) Thurb. (fig. 19).**

Nebraska: Kearney, common in wet meadows near the river, June 20 (268, 2016).

Colorado: Golden, rare, August 29 (2504).

Montana: Townsend, frequent in moist meadows, but too small to be of much value, nearly every specimen infested with smut (405, 2170); Logan, in sandy meadows, July 28, (526); Gallatin, frequent in dry meadows, July 29 (531); Melrose, occasional, in moist sandy soil, August 1 (534).

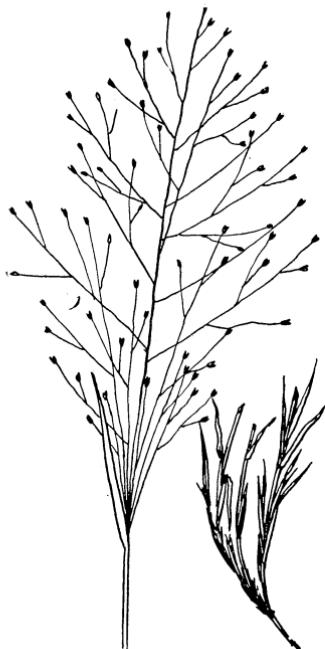


FIG. 19.—Fine-top Salt-grass (*Sporobolus asperifolius*).

Sporobolus confusus (Fourn.) Vasey.

Montana: Logan, dry prairies and sandy brooksides, July 27 (501, 2264); Melrose, in an old road, August 1 (2291).

Sporobolus cryptandrus (Torr.) A. Gray.

Nebraska: Valley, common in sandy soil, of doubtful value, except perhaps for pasture when young, June 18 (253, 2004).

Montana: Melrose, a small form, scarce in moist sandy soil near the river, August 1 (536).

Colorado: Meadow Park, a robust form, rather local, on the hills, August 17 (2367); Georgetown, mountain sides, August 19 (640, 2402); Golden, abundant, August 30 (751).

Sporobolus brevifolius (Nutt.) Scribn. (*Agrostis brevifolia* Nutt.; *Vilfa cuspidata* Torr.).

Nebraska: North Platte, prairies, September 7 (771, 2519).

Sporobolus depauperatus (Torr.) Scribn. (*Vilfa depauperata* Torr.).

Colorado: Georgetown, meadows, August 19 (627).

Idaho: Beaver Canyon, August 7 (2323).

Montana: Manhattan, in meadows, a tall and slender form agreeing in characters with *Vilfa richardsoni* Trin., July 17, (410, 2117); Dillon, in meadows, July 3 (333, 2081); Melrose, in meadows, July 6, (342, 2095); Madison River, in meadows, July 28 (524, 2276); Logan, dry bench lands, July 28 (516), a form which nearly corresponds to the type as figured in Hook. Flor. Bor. Amer.; Butte, July 31 (2297).

Sporobolus gracillimus (Thurb.) Vasey (*Vilfa gracillima* Thurb.).

Colorado: Georgetown, wet sandy places, August 19 (661, 2411).

Cinna latifolia (Trev.) Griseb. (*C. pendula* Trin.).

Montana: Helena, among bushes near the Warm Springs, July 13 (2139).

Colorado: Idaho Springs, moist shady banks of canyon and along streams, August 27 (713, 2473), and a lax, small-panicked form, August 28 (724, 2474).

Agrostis alba L.

Nebraska: Valley, June 18 (251, 2001).

Colorado: Idaho Springs, common, August 27 (735); Golden, common, near Clear Creek, August 29 (748, 2501).

Utah: Logan, in woods, Logan Canyon, August 9 (2349); Echo, a small form with dark-colored panicles, common on the sand bars in the river, August 13 (2359).

Montana: Helena, an excellent hay grass for irrigated land, more leafy and yields more heavily than the eastern *A. alba*, July 12 (384, 2137, 2138); Manhattan, sandy river banks, scarce, July 18 (435); Logan, common, woods and meadows, July 27 (504, 2269, 2349); Melrose, abundant in irrigated meadows, August 1 (543, 2294); Madison River, July 28 (2281, 2282).

Agrostis alba L. var.

A stoloniferous form with short, rather dense panicles, and short leaves.

Colorado: Georgetown, growing on tussocks in a marsh, August 19 (653, 2409).

Agrostis asperifolia Trin.

Montana: Helena, frequent in wet places, an excellent grass, July 13 (385); Bozeman (2220), robust form, along irrigation ditch; (2261) rare in canyon below Mystic Lake; (456) narrow-leaved with contracted dense panicle, frequent in wet meadows, a good hay grass; (2257) a small short-leaved form, culms naked below, and a short narrow dense panicle tinged with red, in the canyon below Mystic Lake; and 500, like 445, July 25; Manhattan, scarce in meadows along

the river, July 18, small form, 445, and 2209, like 456; Logan, near Gallatin River, scarce, a slender, rather lax, bright-green form, July 27 (2263); Lima, a form much like 2263.

Idaho: Beaver Canyon, August 9, 593, a slender, narrow-leaved form with open panicle, 2334, 584, like 445, on the margin of a mountain brook; 576½, scarce, in mountain woods, like 2257, but more leafy.

Agrostis humilis Vasey.

Colorado: Silver Plume, mountain side, August 24 (2456).

Agrostis rubra Linn.?

Colorado: Silver Plume, rare on the sides of the gulch, August 21 (2425).

Agrostis scabra Willd.

Colorado: Georgetown, frequent in the mountains, August 17 (613, 2392).

Montana: Gallatin, very common in wet meadows near the river, July 29 (2288); Manhattan, common in low meadows, in some places constitutes quite a large portion of the hay, July 17 (407, 423, 2173); Helena, railway embankments near the Warm Springs, July 13 (2142).

Idaho: Beaver Canyon, near small stream in the canyon, August 7 (2337).

Agrostis scabra Willd.?

Resembling a large form of *A. scabra*, tall, leafy, with wider leaf blades and larger panicles, the spikelets like *A. scabra*, but the flowering glume awned.

Colorado: Idaho Springs, common in the canyon, August 27 (737, 2485, 2487).

Montana: Bozeman, common in meadows, an excellent hay grass, July 22 (457, 2218, 2221); Townsend, banks of the Missouri River, July 15 (2151); Logan, common, shady river banks, July 29 (510).

Calamagrostis canadensis (Michx.) Beauv.

Colorado: Georgetown, margin of Clear Lake, August 17 (611, 2375); Idaho Springs, shady bank of mountain stream, August 27 (721).

Montana: Helena, among bushes, July 12 (2139½); Manhattan, frequent in moist thickets, an excellent hay grass, July 17 (417), with ligule much elongated; Logan, common along the Madison River, July 28 (579, 2278).

Calamagrostis canadensis acuminata Vasey.

Spikelets 1½ to 2 lines long; empty glumes, sharply acuminate. Approaches *C. langsdorffii*.

Colorado: Georgetown, common, in wet places, August 17 (615).

Montana: Manhattan, common on the river bank, a good hay grass, July 17 (419, 424, 2189).

Idaho: Beaver Canyon, common, August 7 (2328).

Calamagrostis scribneri Beal, Grass. N. Am. 2: 343 (*C. dubia* Scribn., not Bunge).

Colorado: Idaho Springs, frequent along shady brooks, August 27 (728).

Calamagrostis inexpansa A. Gray.

Differs from *C. americana* Scribn. chiefly in its flat or less strongly involute and less rigid leaves, and its less rigid culms.

Nebraska: Central City, banks of Platte, not abundant, June 19 (266, 2008); North Platte, frequent, blades more involute, June 21 (275).

Colorado: Georgetown, frequent along the edge of Clear Creek, August 19 (646).

Calamagrostis macouniana Vasey.

Montana: Manhattan, in thickets near the river, a good hay grass, July 17 (422, 2191½), panicle larger and awns shorter than in the type.

Calamagrostis neglecta Gaertn.

Colorado: Georgetown, frequent along Clear Creek, August 17 (618).

Calamagrostis americana (Vasey); (*Deyeuxia neglecta americana* Vasey, Macoun Cat. Can. Pl., 4: 206 (1888); *Calamagrostis stricta robusta* Vasey, Wheeler's Rep. 6: 285 (1878); *Calamagrostis robusta* Vasey, Contr. U. S. Nat. Herb., 3: No. 1, 82 (1892); not *C. robusta* Franch. & Sav., nor *Deyeuxia robusta* Phil.).

Montana: Townsend, common in low meadows, July 15 (393, 398, 406, 2154); Lima, the principal grass in an alkaline meadow, August 5 (2318, 2319); Manhattan, moist thickets and shady meadows, July 17 (421, 2191); Logan, common, shady river banks, July 27 (503); Madison River, common in wet meadows, a good hay grass, July 28 (522). Confused with *C. neglecta* but distinguished by its rigid, marcid basal sheaths, more rigid culms and leaves, dense panicle and thicker and rougher empty glumes.

Calamagrostis purpurascens R. Br. (*C. sylvatica* Am. auct., not DC.).

Montana: Bozeman, woods on Baldy Peak, July 23 (2224); summit of Mount Bridger (468).

Colorado: Silver Plume, occasional, on the summit of the mountains, altitude 13,000 feet, August 24 (691, 696, 2470); Georgetown, on the mountains, a taller form (about 2 feet), panicle larger, more open, pale green, August 17 (614, 2380).

Calamagrostis suksdorffii Scribn., in Hack., True Grasses.

Montana: Bozeman, in the canyon, very rare, July 23 (2230).

Idaho: Beaver Canyon, one of the most common grasses in the meadows, especially in wet places, August 7 (575, 578, 2325, 2332).

Calamovilfa longifolia (Hook.) Scribn.

Nebraska: North Platte, common along the Platte River, September 7 (770, 2518).

Colorado: La Salle, along irrigation ditches, September 4 (765).

Montana: Townsend, frequent in moist meadows, July 15 (394).

Deschampsia cæspitosa (Linn.) Beauv.

Colorado: Silver Plume, frequent along the mountain brooks about timber line, altitude 11,000 to 13,000 feet, August 22, 24 (675, 683, 703, 709, 714, 2427, 2434, 2457, 2469 $\frac{1}{2}$); Georgetown, in wet places along streams, August 19 (645).

Idaho: Beaver Canyon, common on the mountain sides, June 27 (300).

Montana: Lima, moist shady places, June, August (317, 319, 358, 554 $\frac{1}{2}$, 567, 2067, 2306); Silver Bow, a valuable grass, common in the meadows, July 8 (2113); Manhattan, a valuable hay grass, but not so common here as at other places in the Gallatin Valley, in meadows along the river, July 18 (430, 443, 2202, 2203, 2193); Bozeman, July 22 (2219); Melrose, August 1 (537). Several varieties are included here.

Deschampsia elongata (Hook.) Munro.

Montana: Bozeman, gravelly margin of the creek in the canyon, below Baldy Peak, July 23 (473, 482, 2226).

Avena fatua Linn.

Utah: Cache Junction, common in cultivated fields, in many places quite a pest, August 9 (594); Logan, August 8 (2350).

Avena mortoniana Scribn. (Bot. Gazette, 21: 133, Plate XI).

Colorado: Summit of Grays Peak, August 23 (697, 2439); Robinson, Summit County, altitude 13,800 feet, August, 1896 (1057 Shear).

Trisetum montanum Vasey.

Colorado: Georgetown, hillsides, fairly common, August 17 (622, 2394 $\frac{1}{2}$); Idaho Springs, common, August 28 (718, 720, 2479, 2481, 2484, 2491).

Tristeum subspicatum (Linn.) Beauv.

Colorado: Georgetown, mountain sides, August 17 (624, 656, 2394); Silver Plume, altitude 11,000 to 13,000 feet, frequent in moist places, August 22 (668, 684, 681, 2422); Grays Peak, August 23 (2433, 2435).

Utah: Logan, common on the hillsides, August 6-9 (588, 589, 592, 2348).

Montana: Bozeman, scarce, moist woods near Mystic Lake, July 25 (483, 495, 2243, 2258).

Graphehorum wolfii Vasey.

Montana: Bozeman, near Mystic Lake, rare, July 25 (493, 2253); Lima, common in a moist canyon, August 5 (560).

Danthonia californica Boland.

Montana: Bozeman, moist places in the foothills, July 23 (477, 487).

Danthonia intermedia Vasey (fig. 20).

Montana: Mystic Lake, July 25 (2244).

Idaho: Beaver Canyon, meadows and mountain sides, June-August (302, 586, 2057, 2338).

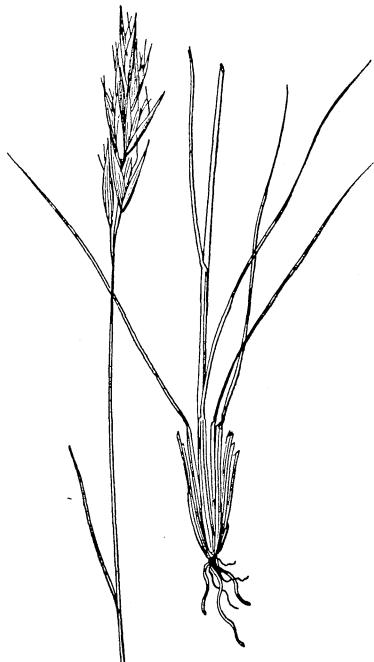


FIG. 20.—Oat-grass (*Danthonia intermedia*).



FIG. 21.—Cord-grass (*Spartina cynosuroides*).

Danthonia parryi Scribn. (Bot. Gazette, 21: 133).

Colorado: Georgetown, August 19 (638, 2397).

Spartina cynosuroides (Linn.) Willd. (fig. 21).

Nebraska: North Platte, common in the meadow near the river, September 5 (2514).

Colorado: La Salle, along irrigation ditches and South Platte River, September 4, (764).

Montana: Logan, rather common; makes fair hay when cut before the stems become tough, said to be spreading rapidly and to be becoming more abundant each year, July 28 (523, 2283).

Spartina gracilis Trin.

Montana: Manhattan, common in wet meadows, July 18 (446, 2204); Townsend, low meadows near the river, good for hay if cut young, July 15 (392, 2152); Dillon, July 3 (335, 2080).

Bouteloua curtipendula (Michx.) Torr.

Nebraska: North Platte, common on the hills, September 7 (2521).

Colorado: Meadow Park, common, August 15 (603, 2364).

Bouteloua hirsuta Lag.

Colorado: Meadow Park, here and there on the hillsides, but not common, August 15 (2360).

Bouteloua oligostachya (Nutt.) Torr.

Nebraska: Central City, the most valuable grass of the high plains; is the best pasture grass even in winter, and is always preferred by cattle and horses to all other grasses; in wet meadows it sometimes becomes 2 or 3 feet high, and then makes excellent hay; June 19 (2012).

Colorado: Georgetown, common on the mountain slopes, August 19 (642).

Montana: Melrose, rare in this region, growing in patches 1 to 10 yards in diameter at intervals over the dry upland prairies, locally known as "buffalo grass," July (351, 2104, 2290); Manhattan, a very valuable species, but each year becoming scarcer, owing to overstocking of the ranges, July (409, 2179).

Beckmannia erucæformis (Linn.) Host.

Colorado: Georgetown, common in wet places, August 19 (659, 2412).

Montana: Madison River, July 28; Townsend, common in wet sandy soil along streams, of considerable value for hay, July 16 (389, 2169); Red Rock, common along streams, July 2 (327); Deer Lodge, common along water courses, July 9 (2134).

Schedonnardus paniculatus (Nutt.) Trelease (*S. texanus* Steud.).

Nebraska: Central City, abundant in the sandy pastures near the Platte River; of no value as a forage plant, June 19 (260, 2006).

Colorado: Idaho Springs, rare, on the mountain sides, August 29 (740).

Bulbilis dactyloides (Nutt.) Raf. (*Buchloë dactyloides* Engelm.).

Nebraska: Central City, covering more or less extensive patches in the meadows and pastures along the Platte River, an excellent pasture grass, often confused with grama (*Bouteloua oligostachya*); its value as forage seems to have been exaggerated; June 19 (267, 2014).

Munroa squarrosa (Nutt.) Torr.

Nebraska: North Platte, on an old prairie-dog town, without economic value, June 21 (277, 2023).

Colorado: Golden, common in waste grounds along the railroad, August 30 (758, 2500); Idaho Springs, rare, in sandy places, August 28 (745).

Montana: Logan, scarce, only found on the railroad track, July 27 (515, 2265).

Phragmites vulgaris Lam.

Nebraska: North Platte, abundant in meadows along the river, September (766).

Colorado: La Salle, along an irrigation ditch, but not common, September 3 (2511).

Montana: Logan, abundant on sand bars along the Madison River, July 28 (525).

Koeleria cristata (Linn.) Pers.

Nebraska: Valley, one of the most valuable grasses for early pasturage, June 18 (2003); Central City, June 19 (255).

Colorado: Georgetown, in a meadow, August 20 (635, 637, 2414½); Idaho Springs, along streams, and on the mountain sides, August (637, 726, 738, 741, 2476, 2482, 2492).

Montana: Lima, one of the most common grasses of the dry prairies (this, a form of *Poa buckleyana*, *Carex filifolia*, and *Agropyron* species, constitute the principal pasturage of this region) July (318, 2069); Manhattan, common in moist meadows, July 17 (412); Deer Lodge, common in river meadows, July 9 (373); Silver Bow, July 8 (2111).

Idaho: Beaver Canyon, rare, moist mountain sides, August 7 (585).

Eatonia obtusata (Michx.) A. Gray.

Nebraska: Valley, a form with purplish panicles (var. *purpurascens* Vasey in U. S. Natl. Herb.), common on low ground, June 18 (252, 252 $\frac{1}{2}$, 2002); Kearney, in low land, probably of some value as pasture, June 20 (271).

Montana: Townsend, common in wet meadows, a fair hay grass, July 15 (390, 2150) a large form (var. *robusta* Vasey); Melrose, common in moist sandy soil, August 1 (540); Manhattan, rare, on the shady river banks, July 9 (439).

Eatonia pennsylvanica (D. C.) A. Gray.

Montana: Manhattan, in moist thickets and wet meadows, but not common, July 17 (428, 442, 2174); Logan, a good hay grass, in meadows near the river, July 27 (517, 2268).

Eatonia pennsylvanica major Torr.

Colorado: Idaho Springs, scarce, on the moist mountain slopes, August 29 (742).

Montana: Townsend, sand bars in the Missouri River, July 15 (2160); Bozeman, scarce, in wet meadows, a good hay grass, July 22 (458); Melrose, rare, August 1 (538).

Eragrostis major Host.

Nebraska: Central City, common along roadsides, June 19 (265); North Platte, prairies, September (2520).

Colorado: Golden, common in waste ground, August 30 (757).

Eragrostis pectinacea (Michx.) Steud.

Colorado: Meadow Park, only a few plants seen along an old road, August 15 (2365).

Catabrosa aquatica (Linn.) Beauv.

Montana: Bozeman, common in ditches, July 22 (462); Townsend, rather scarce, in shady meadows, July 16 (401).

Idaho: Beaver Canyon, common in wet places, perhaps of some economic value, June 27 (295, 2052).

Melica aristata Bolander.

Montana: Bozeman, on moist mountain sides about Mystic Lake, July 25 (491, 2246, 2250); in the canyon below Baldy Peak, July 23 (2232).

Melica bulbosa Geyer. (fig. 22).

A reduced few-flowered form = 304 S. Watson from Nevada.

Montana: Bozeman, frequent in the mountains, July 23 (470); Lima, moist shady mountain sides, August 6 (557).

FIG. 22.—Thick-rooted Bunch-grass (*Melica bulbosa*).

Melica parviflora (Porter) Scribn. (*M. porteri* Scribn.).

Colorado: Idaho Springs, in shady situations, not common, August 28 (732, 2486).

Melica spectabilis Scribn.

Idaho: Beaver Canyon, shady mountain sides, rare, June 27 (307).

Montana: Bozeman, common on the hillsides around Mystic Lake, July 25 (496, 2248).

Distichlis spicata stricta (Thurb.) Scribn. (*Brizopyrum maritimum strictum* Thurb.).

Nebraska: North Platte, abundant in alkaline soil and salt meadows, June 21 (276, 2019). Cattle seem to avoid this grass as long as it is possible to obtain anything else.

Montana: Melrose, common in alkaline soil, July 6 (344).



Dactylis glomerata Linn.

Colorado: Georgetown, August 17 (625).

Poa alpina Linn.

Colorado: Georgetown, in wet sandy soil, scarce, August 20 (662, 2386); Silver Plume, along the margins of a brook at the foot of Grays Peak, August 23 (687, 2445).

Montana: Lima, in moist thickets along a mountain brook, August 6 (563, 2305); Bozeman, in the canyon below Mystic Lake, scarce, July 25 (2234), and with this a few specimens (2236) was found a form with elongated leaves and larger panicle and spikelets.

Poa annua Linn.

Colorado: Georgetown, in moist places, common, August 18 (652, 2385).

Utah: Echo, common along a small stream, August 13 (2357).

Poa arctica R. Br.

Colorado: Silver Plume, frequent along the margins of a stream near timber line, altitude about 10,000 feet, August 24 (676, 699); Grays Peak, in moist places near Stephen's mine, altitude 11,000 to 12,000 feet, August 23 (682, 2443).

Poa arida Vasey. (*P. andina* Nutt.).Nebraska: Kearney, abundant in the drier meadows along the Platte River, constituting about half the grass; it makes a turf inferior to that of *Poa pratensis*, but grows in much poorer and harder soil, where it might be substituted for that species; it does not grow in the driest places and is hardly to be recommended for the arid regions unless it can receive a comparatively good supply of water. Sometimes cut for hay, but better suited for pasture; June 20 (270, 2017).

Wyoming: Green River, frequent in meadows, June 25 (287).

Poa cæsia J. E. Smith.

Colorado: Silver Plume, growing in a gulch, occasional, altitude about 11,000 feet, August 27 (667).

Poa compressa Linn.

Colorado: Georgetown, meadows, August 19 (650, 2406).

Montana: Deer Lodge, July 9 (2132 $\frac{1}{2}$); Helena, along streams and irrigating ditches, July 13 (382, 399, 2143).**Poa cusickii** Vasey.

Idaho: Beaver Canyon, on the foothills and mountains, in woods, June 27 (309, 2055)..

Poa epilis Scribn. (*P. cuspidata* Vasey, in part).Colorado: Silver Plume, along streams upon the mountain sides, common, altitude, 12,000 to 13,000 feet, August 24 (702, 712, 2471). This grass has been confused with *P. cuspidata* Vasey, which, according to type specimens, is *P. wheeleri*.**Poa fendleriana spicata**. (Vasey) Scribn. (*P. arida spicata* Vasey).

Colorado: Silver Plume, along mountain streams, altitude 11,000 feet, August 21 (666, 672, 2418); Grays Peak, in woods at the foot of Grays Peak, scarce, August 23 (685, 2444).

Montana: Townsend, on sand bars in the Missouri River, rare, July 15 (2158); Silver Bow, a bunch grass growing very sparingly on the hillsides, July 8 (2112); Manhattan, in a meadow, not common, July 17 (2178). This differs from the species in its taller habit, longer, narrower, and interrupted greenish panicle.

Poa lœvigata Scribn. (*P. larvis* Vasey, not Borb.).Plant somewhat glaucous; culms cæspitose; the dry, persistent basal sheaths rather rigid; blades rather short, narrow, strongly involute, rigid; panicle narrow; spikelets much as in *Poa buckleyana*.

Wyoming: Green River, on very dry hills, but only in scattered bunches, June 25 (2039). A low, short-leaved form.

Montana: Red Rock, common in meadows, an excellent grass, worthy of cultivation, July 2 (325); Melrose, common in wet meadows, a fair hay grass, July 6 (343, 348, 2096, 2097) (the last two like No. 2039, but less rigid); in dry soil in a meadow August 1 (2296); Deer Lodge, common in meadows along the river, July 9 (363, 374, 2129) (the last two representing a reduced form with culms 9 inches or less high, and few and small leaves; of more value for pasturage than for hay); Lima, forms a very good meadow, August 5 (2320).



FIG. 23.—Mountain Blue-grass (*Poa nevadensis*).

Poa laxa occidentalis Vasey.

Colorado: Grays Peak, altitude 13,000 to 14,000 feet, August 23 (690, 2440).

Poa lettermani Vasey (*P. brandegeei* Beal, *Grasses N. Am.*, 2: 544).

Colorado: Grays Peak, altitude 14,000 feet, scarce near the summit, August 23 (689, 2441, 2448).

Poa lucida Vasey. (This species is closely allied to *P. buckleyana*.)

Colorado: Georgetown, hillsides near Clear Lake, August 17 (2376); Silver Plume, August 24 (2465 $\frac{1}{2}$).

Wyoming: Green River, in meadows, apparently an excellent grass, June 25 (288).

Montana: Lima, along the margin of a mountain brook, not common, August 6 (562, 2312).

Poa nemoralis Linn.

Colorado: Georgetown, frequent among rocks on mountain sides, altitude 10,000 feet, and in the canyon, August 17 (607, 619, 2388); Silver Plume, frequent on the mountain side and along the brook, August 21 (670), ligule longer and culms and sheaths more scabrous than in typical specimens (2420), like No. 670, but smoother; Idaho Springs, frequent on a gravelly hillside, August 27 (734).

Idaho: Beaver Canyon, frequent in mountain woods, August 7 (576).

Utah: Echo, common in the canyon, August 13 (2355).

Montana: Melrose, only a few specimens found among bushes in a canyon, July 6 (2100); Manhattan, rather scarce in woods and meadows along the Gallatin, July 17 (2175, 2192); Bozeman, common in the woods below Baldy Peak, July 23 (2229), in wet canyon (463), scarce, in stony places near the summit of the mountains (469); Lima, rather common in the canyon, August 6 (2309), frequent on dry hills (556), on the moist bank of a mountain stream (564) (a form approaching *P. flava*).

Poa nevadensis Vasey (fig. 23).

Idaho: Beaver Canyon, frequent in mountain woods, August 7 (580).

Montana: Red Rock, a "bunch-grass," very common in a meadow, without doubt an excellent grass for hay and worth cultivating, July 2 (2091); Bozeman, on hillsides east of Mystic Lake, July 25 (2259) (a form with dense panicle); Melrose, quite abundant in an irrigated meadow with *Agrostis alba* and *Poa pratensis*, August 1 (541, 2293); Lima, frequent in the foothills and on the banks of streams, August 5 (552, 567); with *Poa lucida*, August 6 (2313) (a form with dense panicle).

Poa pattersoni Vasey.

Colorado: Grays Peak, altitude 13,000 to 14,000 feet, frequent, August 23 (690).

Poa pratensis L. (Kentucky Blue-grass.)

Nebraska: Central City, a tall, broad-leaved form, apparently native in Nebraska, growing always near water on river banks, etc., found scantily near Platte River, June 19 (2007).

Colorado: Georgetown, along mountain streams, in meadows, and on moist mountain sides, in some places rare, in others common, in one place growing with *Danthonia parryi*, August 17-20 (617, 623, 626, 634, 2384, 2398, 2413); Idaho Springs, in some places frequent, in others scarce, in a moist, shady canyon and along brooks, August 27 (719, 722, 727); common in a canyon, August 28 (2480) (a stout form, with wide blades and large panicle).

Wyoming: Green River, escaped along the river, not common, June 25 (2031).

Idaho: Beaver Canyon, not common but apparently indigenous (2051), frequent in moist meadows, June 26 (294); growing luxuriantly in damp woods on a mountain side, June 28 (304, 2062); frequent on shady mountain sides, June 27 (298) (a slender form, with narrow blades and small panicles).

Montana: Red Rock, wet places along streams (as this variety is tall and leafy it would doubtless be valuable for hay), July 2 (329, 2092); Melrose, abundant in irrigated meadows, where it seems to be the principal grass, and is very valuable for hay, being known locally as "red-top," a name also applied to *Deschampsia cespitosa*, July 6 (2101), July 7 (360), July 6 (2102) (a taller form growing in wetter places, with less purple panicle); Deer Lodge, frequent in meadows along the river, a tall, very leafy form, doubtless excellent for hay, July 9 (376, 2133); Townsend, in woods near the river, scarce (2167), frequent in moist, shady meadows, a good hay grass, July 16 (400); Manhattan, in woods near Gallatin River, July 17 (2181); Bozeman, in a meadow near the experiment station, scarce, July 22 (2215, 2217), occasional along a stream in Bozeman Canyon (489), scarce, in woods near Mystic Lake, July 25 (484) (a stout form with wide blades and large panicle); Melrose, August 1 (2295); Lima, comparatively common in the canyon, August 6 (2310).

Poa rupestris Vasey, not Bieb.

Colorado: Silver Plume, occasional on mountain summits, altitude 11,000 to 13,000 feet, August 24 (694, 2454). Apparently a reduced form of *P. nemoralis*.

Poa flava Linn. (*P. serotina*, Ehrh.) (fig. 24).

Colorado: Georgetown, scarce, along the margin of Clear Creek, August 16-18 (663, 2396); Idaho Springs, common along a shady brook, August 27-28 (716, 2478).

Montana: Helena, among bushes near the Warm Springs, July 13 (2144, 2145); Townsend, near the Missouri River, rare, July 15 (2162); Manhattan, rather common in wet woods near the river, July 17 (427 $\frac{1}{2}$, 2190); Bozeman, occasional in

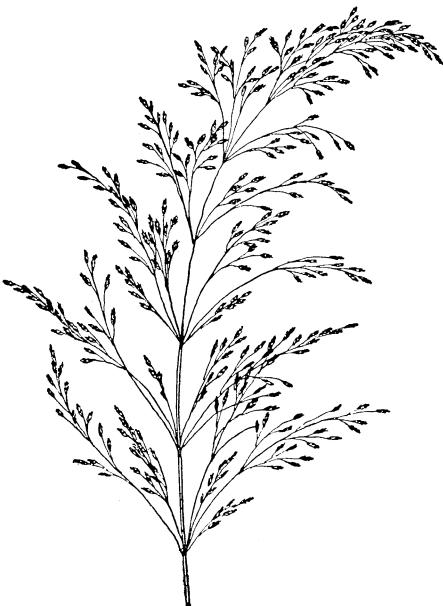


FIG. 24.—False Red-top (*Poa flava*).

Bozeman Canyon, July 25 (499) (a form approaching *Poa nemoralis*); Logan, scarce, in a moist thicket near Gallatin River, apparently an excellent grass, July 27 (513, 2267); Gallatin, in a ditch near the river (2289), scarce, in a dried-up pond, July 29 (532).

Poa subaristata Scribn. (in Beal, Grasses N. Am., 2: 533).

Idaho: Beaver Canyon, common on dry hills, where it is one of the most valuable pasture grasses, June 27 (2056).

Montana: Lima, common on hills and mountains, forming a considerable percentage of the grass and furnishing good pasturage, June 30-July 1 (311, 315, 321, 322, 323, 2075, typical). Nos. 311, 315, and 2056 are doubtfully referred here.



FIG. 25.—Bunch Red-top (*Poa buckleyana*).

Poa suksdorffii Vasey.

Colorado: Silver Plume, very rare, on the summit of the mountains, altitude 13,000 feet, August 24.

Montana: Lima, occasional on hillsides and mountains, June 30 (312).

Poa buckleyana Nash (*P. tenuifolia* Buckl.) (fig. 25).

Colorado: Georgetown, only one small tuft found, leaves more or less glaucous, August 17 (2390); Silver Plume, a "bunch-grass" comparatively common in the gulch (2428), scarce along the margin of a mountain brook, August 21-24 (680, 2465 $\frac{1}{2}$).

Wyoming: Dry prairies along the Union Pacific Railway, June 24 (280); Green River, in a meadow near the river, not frequent, June 25 (2034).

Idaho: Beaver Canyon, common on gravelly mountain sides and dry hills, constituting a considerable part of the pasturage, June 27 (299, 308, 2056 $\frac{1}{2}$); in woods, June 28 (2063).

Montana: Bozeman, common on stony mountain sides, July 23 (467), only two specimens found in a canyon below Mystic Lake, July 25 (2260) (a lax form with slightly pubescent flowering glumes, probably growing in wet ground); Lima, in a meadow near a stream, August 5 (2321).

Poa wheeleri Vasey.

Colorado: Silver Plume, common along the brook, August 21-24 (705, 2419, 2421, 2462, 2462 $\frac{1}{2}$); occasional along a stream in a gulch, altitude about 11,000 feet, August 21 (665, 674); along a brook near timber line, August 24 (698, 701, 710).

Idaho: Beaver Canyon, on wooded hillsides, a very common and luxuriant apparently valuable grass, June 27 (297, 2059).

Montana: Bozeman, very scarce on the gravelly bank of a brook in Bozeman Canyon, July 25 (478, 490).

Utah: Logan, in moist ground near the summit of a mountain, scarce, August 9 (590, 591).

Puccinellia airoides (Nutt.) Wats. & Coult. (*Poa airoides* Nutt.) (fig. 26).

Wyoming: Along Green River, June 25 (286, 2033).

Montana: Dillon, irrigated meadows, not common, July 3 (331), August 2 (2298); Manhattan, wet meadows, July 19 (2198); Helena, along irrigating ditches, July 12 (380, 2135); Silver Bow, in dry places by the roadside, July 8 (359); Melrose, in meadows, scarce, August 1 (545).

Panicularia aquatica (Linn.) Kuntze. (*Glyceria aquatica* J. E. Smith).

Utah: Echo, about a mill pond, August 13 (2354).

Montana: Garrison, frequent in wet, shady places along the river, July 10 (370, 2124); Townsend, common in wet thickets, July 16 (402); Bozeman, common in wet places, July 22 (454); Logan, common near water and said to make fair hay, July 27 (509, 2266).

Colorado: Georgetown, frequent in wet places, August 19 (657).

Panicularia nervata (Willd.) Kuntze (*Glyceria nervata* Trin.).

Colorado: Idaho Springs, frequent along streams, August 27 (731).

Montana: Lima, common in wet places, June 29 (316, 2068, 2307); Manhattan, frequent in wet, shady places, July 17 (418, 426, 2182, 2200).

Festuca elatior Linn.

Montana: Helena, occasional in wet places, July 13 (388, 2141).

Utah: Logan, at the experiment station, August 9 (2352).



FIG. 26.—Manna-grass (*Puccinellia airoides*).



FIG. 27.—Sheep Fescue (*Festuca ovina*).

Festuca jonesii Vasey.

Montana: Bozeman, rare in woods and thickets, with *Bromus ciliatus*, July 24 (465, 2228).

Festuca ovina Linn. (fig. 27).

Colorado: Georgetown, common on hills and mountain sides, August 17 (625 $\frac{1}{2}$, 2379); Silver Plume, on moist mountain sides, altitude 11,000 feet, August 21-24 (671, 708, 2117, 2415); Idaho Springs, frequent in a moist canyon, August 27 (715, 2483).

Idaho: Beaver Canyon, common on the mountain sides and apparently a good pasture grass, especially for sheep, June 27 (305, 2061), August 7 (581, 2331).

Montana: Lima, abundant, especially on the foothills and mountain sides, in many places constituting half of all the grass and affording excellent winter grazing, June 30 (310, 314, 320, 370, 2070), August 6 (2316); Bozeman, frequent on the mountain sides, a good pasture grass, July 24 (475, 2231).

Festuca ovina brevifolia (R. Br.) S. Wats.

Colorado: Grays Peak, in moist places, frequent, altitude 14,000 feet, August 23 (688, 2449, 2450).

Festuca ovina arizonica (Vasey) Beal.

Colorado: Idaho Springs, a rare, glaucous bunch-grass, August 28 (2472).

Festuca kingii (S. Wats.) Scribn. (*Poa kingii* S. Wats.).

Montana: Lima, a tall, diaceous "bunch-grass," occasional or common in the foothills and canyons, June 30 (313, 2065), August 6 (561, 2303).

Festuca rubra Linn. (fig. 28).

Colorado: Idaho Springs, rare on the sides of a canyon, August 28 (2477).

Montana: Deer Lodge, abundant in meadows along the river, in some places the predominant species, and apparently valuable for hay, July 9 (377, 2123); Silver Bow, frequent in moist meadows, July 8 (353, 2108); Bozeman, common in meadows on the experiment station farm, and considered a good hay grass, July 22 (460, 492, 2223); common on the moist mountain sides about Mystic Lake, July 25 (464, 492, 2262); Butte, in a low meadow, scarce, July 31 (547).



FIG. 28.—Red Fescue (*Festuca rubra*).

Festuca scabrella Torr.

Montana: Silver Bow, a valuable bunch-grass, frequent on the hill and mountain sides, July 8 (356, 2106).

Festuca octoflora Walt. (*F. tenella* Willd.).

Colorado: Golden, in a canyon southeast of Idaho Springs, rare, August 30 (2498).

Bromus brizæformis Fisch. & Meyer.

Utah: Echo, a few specimens found near an old mill, August 13 (2353).

Bromus breviaristatus (Hook.) Buckl. (*B. aleutensis* Trin.).

Idaho: Beaver Canyon, frequent in meadows along a mountain stream, August 7 (573, 596, 2322, 2342).

Utah: Logan, common in woods, August 9 (2347).

Montana: Deer Lodge, common in a meadow, July 9 (378, 2119); Lima, frequent on moist mountain sides (560 $\frac{1}{2}$, 569, 2314); Bozeman, in cultivated fields, frequent, July 22–25 (449, 476, 2213, 2233 $\frac{1}{2}$, 2247); Manhattan, frequent in moist shady places along the river, July 17 (415).

The specimens from Idaho and Utah and No. 560 $\frac{1}{2}$ from Montana are glabrous, with the glumes seaceous, the outer ones acute. In all the other specimens the spikelets are pubescent, as are the lower sheaths and leaves.

Bromus ciliatus Linn.

Colorado: Silver Plume, frequent on mountain sides, August 21–24 (679, 711, 2466); Georgetown, above Colorado Central mine, a form with stout culms and large spikelets, August 17 (2381).

Idaho: Beaver Canyon, August (723, 2329).

Montana: Manhattan, frequent in moist meadows, July 17 (431); Bozeman, in woods, a form with a rather lax, slender, and few-flowered panicle, July 23 (2227); along the banks of the Madison River, not common, July 28 (2275).

Bromus porteri (Coulter) Scribn.

Colorado: Georgetown, common on mountain sides, August (610, 624); Idaho Springs, on mountain sides and along the road, frequent, August (739, 2490, 2496).

Bromus inermis Leyss. (Smooth Brome-grass).

Montana: Bozeman, cultivated on the experiment station grounds, where it is said to withstand dry weather well, July 22 (447).

Bromus kalmii A. Gray.

Utah: Cache Junction, August 9 (597).

Idaho: Beaver Canyon, common in a meadow, August 7 (2344).

Montana: Bozeman, in woods in the canyon, rare, a taller weak-stemmed form, with more spreading and many-flowered panicle, resembling *B. ciliatus*, July 22 (2227½); Lima, frequent along the moist bank of a mountain brook, August 6 (566, 2315).

Bromus mollis Linn.

Montana: Garrison, only a few specimens found on a railway embankment, July 10 (2126).

Bromus pumpellianus tweedyi Scribn. var. nov.

Culms stout, about 2 feet high; leaves short; panicle dense, short; spikelets small; flowering glumes very villous.

Montana: Lima, frequent along a mountain brook, August 6 (568, 2304).

Bromus secalinus Linn.

Montana: Garrison, near the railway track, scarce, July 10 (368); Bozeman, in a moist meadow with *B. brevioristatus*, rare, July 22 (453, 2214).

Agropyron caninum R. & S.

Montana: Manhattan, in a moist meadow, July 17 (416, 2176); Bozeman, in a moist meadow, July 22 (452); Melrose, in moist sandy soil, August 1 (542).

Agropyron dasystachyum subvillosum Scribn. & Smith.

Colorado: Georgetown, low ground, August 19 (631).

Idaho: Beaver Canyon, August 7 (587, 2341).

Montana: Deer Lodge, on the river bank July 9 (2130); Red Rock, in a meadow. August 3 (549).

Agropyron divergens Nees.

Idaho: Beaver Canyon, on hillsides, June 28 (2064).

Montana: Lima, July 1-2, August 6 (326, 330, 559); Melrose, rocky hillsides, July 6 (2103); Silver Bow, hillsides, July 6 (2110); Bozeman, mountain sides, July 23 (472, 474).

Agropyron divergens tenuispicum Scribn. & Smith.

Montana: Lima, prairies, July 1 (2074); Melrose, rocky cliffs, July 6 (347); Helena, hillsides, July 12 (2147).

Agropyron gmelini Scribn. & Smith.

Idaho: Beaver Canyon, August 7 (2327).

Montana: Deer Lodge, in a meadow, July 9 (379); Bozeman, on Baldy Peak, July 23 (2233).

Agropyron pseudorepens Scribn. & Smith.

Nebraska: Kearney, in a meadow, June 20 (272, 2018).

Colorado: Georgetown, mountain side, August 17-19 (621, 649, 651); Idaho Springs, August 27-28 (733, 2488).

Montana: Dillon, on the bank of a brook, July 3 (340, 2088); Helena, along a ditch, July 12 (383); Manhattan, on a shady river bank (411), in sandy places, July 17-18 (440).

Agropyron pseudorepens magnum Scribn. & Smith.

Colorado: Enterprise, August 19 (2401). The type.

Agropyron riparium Scribn. & Smith.

Montana: Deer Lodge, July 9 (372); Garrison, on a river bank, July 10 (369, 2127).

Agropyron scribneri Vasey.

Colorado: Silver Plume, summit of mountain, August 24 (2453).

Agropyron spicatum (Pursh) Scribn. & Smith (*A. glaucum* Am. auct.).

Nebraska: Central City, June 19 (256).

Montana: Logan, moist thickets, July 27 (514, 2271).

Agropyron spicatum molle Scribn. & Smith.

Montana: Helena, July 13 (386); Gallatin, in meadows, scarce, July 29 (530); Lima, in a meadow, August 5 (2317).

Agropyron tenerum Vasey.

Colorado: Georgetown, in a meadow, August 17-19 (2391).

Idaho: Beaver Canyon, August 7 (2330).

Montana: Townsend, on a sand bar in the Missouri River, July 15-16 (2159), in a meadow (404); Manhattan, July 17 (2177); Butte, in a meadow, July 31 (546); Lima, August 6 (572).

Agropyron vaseyi Scribn. & Smith.

Utah: Echo, August 13 (2356).

Montana: Townsend, on a hillside, July 16 (2164); Dillon, prairies, August 2 (2299); Lima, August 5 (2301).

Agropyron violaceum andinum Scribn. & Smith.

Colorado: Silver Plume, summit of mountains, altitude 13,000 feet, August 24 (393, 682, 692).

Hordeum jubatum L.

Nebraska: Central City, abundant throughout the Platte Valley, and a great pest, in many places taking almost complete possession of the meadows, and of no value except when very young, June 19 (263, 2010).

Colorado: Georgetown, common in low ground, August 9 (664).

Montana: Deer Lodge, in meadows, in one meadow constituting nearly one-half of the grass, July 9 (375, 2117).

Hordeum nodosum L.

Colorado: Georgetown, a "bunch-grass," occasional along a brook, August 17 (620, 2387, 2395).

Wyoming: Green River, only a few specimens collected near the river, June 25 (2030).

Idaho: Beaver Canyon, frequent on rocky hills, June 27 (303).

Montana: Dillon, frequent in gravelly soil along the river, of no economic value, July 3 (336, 2082); Melrose, common on the river bank, July 6 (2099); Bozeman, frequent about Mystic Lake, July 25 (488); Lima, frequent along the bank of a mountain stream, August 6 (565).

Elymus canadensis L.

Colorado: Georgetown, common at the entrance of Clear Creek Canyon, August 30 (752).

Montana: Logan, two specimens found along the railway track (2270 frequent on shady river banks) July 27 (505); Gallatin, a few specimens found in a meadow and on the railway embankment, said to be a good hay grass, but often infected with ergot, July 29 (2284-2287).

Elymus robustus Scribn. & Smith.

Colorado: Idaho Springs, on the bank of a brook, local, August 28 (2495).

Elymus canadensis glaucifolius (Muhl.) Torr.

Montana: Townsend, culms rather low, stout and hard, whole plant glaucous, July 16 (2163).

Elymus condensatus Presl. (fig. 29).

Wyoming: Wamsutter, a tall "bunch-grass," 3 to 5 ft. high, growing along the railway, June 24 (2027); Green River, frequent in meadows, June 25 (289).

Montana: Helena, in a prairie, sometimes 5 to 6 feet high, growing in big clumps or bunches (2136), common in sandy and gravelly soil along streams, too rank and tough for hay, July 12 (381); Townsend, frequent in low ground near the Missouri, July 15 (391); Bozeman, frequent in moist, shady places, July 23 (471).

Elymus glaucus Buckl.

Utah: Logan, common in woods in the canyon, August 9 (2346).

Idaho: Beaver Canyon, comparatively rare in a wooded canyon (2324), common on the hill-side west of the canyon, August 7 (574, 2326).

Montana: Bozeman, in a canyon below Baldy Peak, not common, July 23 (2225).

Elymus macounii Vasey.

Montana: Townsend, common in meadows along the river, perhaps a good hay grass, July 16 (403, 2168); Bozeman, frequent in a moist field, July 22 (450); frequent in the foothills, July 23 (466); Logan, in thickets and on a gravelly river bank, scarce, July 27 (506, 512); Red Rock, frequent in a meadow, August 3 (550).

Elymus triticoides (Nutt.) Buckl.

Colorado: Georgetown, frequent on hills above Clear Lake, August 17 (609, 2371, 2378), scarce in a valley, August 19 (633); Enterprise, very common in a valley, August 19 (2400); Silver Plume, frequent in the mountains, August 24 (706); Idaho Springs, frequent on moist mountain sides and on the sides of the canyon, August 27-28 (736, 2475).

Wyoming: Green River, a common "bunch-grass" on the bluffs (282), a "bunch-grass" growing on the very driest and hardest hills ("bad lands"), June 25 (2041).

Montana: Dillon, a tall, coarse "bunch-grass," growing especially in moist places along railways, perhaps of some value for hay, but probably too coarse, July 3 (332, 2076), dry prairies, not common, August 2 (2300); Madison River, here and there in the meadows with *Agropyron spicatum* and another species of *Agropyron*, regarded as a good hay grass, July 28-29 (2274, 2279).

Elymus angustus Trin. (in Ledb. Fl. Alt.).

Wyoming: Green River, only a few specimens found at edge of the river, June 25 (284).

Sitanion elymoides Rafin. (*Elymus sitanion* Schultes).

Colorado: Georgetown, occasional in the mountains, August 17 (612), common at roadsides, August 20 (2414); Idaho Springs, common on hillsides in the canyon, August 27-28 (717, 2497); Boulder, hillsides, not common, September 3 (2509).

Wyoming: Wamsutter, dry soil near the railway, June 24 (280 $\frac{1}{2}$, 2028); Green River, a small form, frequent on the bluffs, June 25 (283).



FIG. 29.—Wild-rye (*Elymus condensatus*).

CYPERACEÆ.¹

Cyperaceæ, or sedges, like rushes, grow in moist places and are commonly taken for grasses. The true sedges are abundant in bogs and meadows throughout the Rocky Mountain country, in some places making a large part of the early hay. They are inferior, however, to some of the grasses.

***Cyperus schweinitzii* Torr.**

Colorado: Meadow Park, rare, here and there on the hillsides, August 15 (2362).

***Scirpus americanus* Pers.**

Nebraska: North Platte, common, September (2522).

Montana: Townsend, common in a meadow near a pond, July 15 (2153).

***Scirpus lacustris* L.**

Montana: Madison River, July 23 (2277); Townsend, common in water, in meadows, July 15 (397, 2148); Logan, common in wet places in meadows, July 27 (521).

***Scirpus microcarpus* Presl.**

Montana: Dillon, common near water, July 2 (2083); Logan, in wet meadows, July 27 (520); Manhattan, in wet thickets, July 17 (429); Townsend, near the Missouri River, July 15 (2165).

***Scirpus pauciflorus* Lightf.**

Colorado: Georgetown, common near water with *Eleocharis acicularis*, August 17 (2408).

***Eleocharis acicularis* R. & S.**

Colorado: Georgetown, common in wet places, August 17 (2407).

Montana: Manhattan, bottom of a dry ditch, July 17 (2206).

***Eleocharis palustris* R. & S.**

Nebraska: North Platte, wet meadows along Fremont's Slough, in many places constituting the bulk of the hay, June 21 (2026).

Montana: Manhattan, July 17 (408, 2208); Dillon, sandy places near the river, scarce, July 2 (2079); Townsend, common in wet places, July 15 (2157).

***Eleocharis palustris* R. & S. (?)**

Wyoming: Green River, meadow near the river, June 25 (2040).

***Carex acutina* Bailey (?)**

Colorado: Georgetown, in a "draw" at south end of Clear Lake, August 17 (2377); Silver Plume, around springs near brook, August 21 (2463).

***Carex alpina* Swartz.**

Colorado: Georgetown, near Clear Lake and along a brook in the canyon, August 17 (2368, 2373); Idaho Springs, rare, August 21 (2430).

***Carex athrostachya* Olney.**

Wyoming: Green River, in a "draw," June 25 (2032).

Montana: Bozeman, common in meadows, July 22 (455, 2216).

***Carex atrata* L.**

Colorado: Silver Plume, along brook, common, August 21 (2436, 2461).

***Carex aurea* Nutt.**

Montana: Manhattan, dry prairies, common, July 17 (2205); Bozeman, near Mystic Lake, July 25 (2240).

¹*Cyperus*, *Eleocharis*, and *Scirpus* determined by Dr. N. L. Britton; *Carex* determined by Prof. L. H. Bailey.

Carex canescens L.

Montana: Bozeman, rare, low grounds around Mystic Lake, July 25 (480, 2235).

Carex canescens alpicola Wahl.

Montana: Bozeman, east side of Mystic Lake, not common, July 25 (2239).

Carex crawei Dewey.

Nebraska: North Platte, islands in the Platte River, June 21 (274, 2021).

Carex deflexa media Bailey (Mem. Torr. Club, 1:43, 1889).

Colorado: Silver Plume, common, moist mountain slopes, August 21 (669, 2416).

Carex douglasii Boott.

Wyoming: Green River, common, June 25 (2036, 2038).

Montana: Logan, common in wet gravelly pastures, eaten by cattle, July 27 (502); Gallatin, common in dry meadows, July 29 (529).

Carex engelmanni Bailey (Proc. Amer. Acad., 22:132, 1886).

Colorado: Silver Plume, August 21 (2455).

Carex festiva Dewey.

Colorado: Georgetown, near Clear Lake, August 17 (2374, 2382); Silver Plume, common near brooks, August 21 (2429, 2464, 2469).

Montana: Lima, wet meadows, not common, June 30 (2073); Bozeman, common, near Mystic Lake, July 25 (2252).

Idaho: Beaver Canyon, abundant in wet meadows, forming a considerable portion of the hay in such places, June 26 (293, 2049).

Carex festiva haydeniana W. Boott.

Colorado: Silver Plume, near brooks, August 21 (2460).

Carex festiva stricta Bailey (Mem. Torr. Bot. Club, 1:51, 1889).

Montana: Lima, common, in moist shady places, August 5 (572 $\frac{1}{2}$).

Colorado: Georgetown, common, meadows, August 17 (660, 2405); Silver Plume, along brooks, August 21 (2462).

Carex festiva Dewey var.

Montana: Manhattan, scattered through the woods near the river, July 17 (2186).

Idaho: Beaver Canyon, rare, in a meadow, August 7 (2333).

Carex filifolia Nutt. var.

Colorado: Silver Plume, August 21 (2451).

Carex filifolia Nutt. var. ? miser Bailey.

Colorado: Silver Plume, August 21 (2437).

Carex filiformis latifolia Boeckl.

Wyoming: Green River, rare, in a "draw," June 25 (2037).

Idaho: Beaver Canyon, common, wet meadows, June, August (2043, 2336).

Montana: Townsend, rather common, wet meadows, July 15 (2156); Logan, very common, July (2273); Manhattan, common in the woods, July 17 (2183, 2188); Red Rock, July 1 (2090, 2093); Bozeman, July (451).

Carex hoodii Boott.

Montana: Bozeman, rather common, Mystic Lake, July 22 (486).

Carex idahoae Bailey (Bot. Gaz., 21:5, 1896).

Idaho: Beaver Canyon, in a meadow with *Danthonia intermedia*, August 7 (2339).

Carex incurva Lightf.

Colorado: Silver Plume, August 21 (2446).

Carex liddoni Boott.

Idaho: Beaver Canyon, among bushes, June (2058).

Carex marcida Boott.

Montana: Silver Bow, abundant in boggy places, July (355); Bozeman, common in meadows, July 22 (459); Lima, abundant in alkaline meadows, forming in some places the bulk of the hay, August 5 (571).

Carex nebrascensis Dewey.

Montana: Bozeman, abundant in a wet meadow, July 22 (461 $\frac{1}{2}$).

Carex nebrascensis prævia Bailey (Mem. Torr. Bot. Club, 1: 49, 1889).

Idaho: Beaver Canyon, common in wet places, June 26 (2053).

Carex nova Bailey.

Colorado: Silver Plume, common along brooks, altitude 11,000 feet, August 21 (677, 2424, 2431, 2432).

Carex parryana unica Bailey (Mem. Torr. Bot. Club, 1: 54, 1889).

Montana: Deer Lodge, common, prairies, July 9 (2128).

Idaho: Beaver Canyon, rather uncommon, in a meadow, June 26 (2050).

Carex pratensis Drejer.

Montana: Bozeman, east of Mystic Lake, July 25 (2251).

Idaho: Beaver Canyon, in meadows, August 7 (2340).

Carex raynoldsii Dewey.

Montana: Bozeman, moist, shady places near Mystic Lake, rare, July (497, 2254).

Carex siccata Dewey.

Colorado: Georgetown, along brooks, rare, August 17 (2370).

Silver Plume, common, August 21 (2423).

Carex stenophylla Wahl.

Montana: Lima, dry meadows and prairies, furnishing some pasturage, June 30 (324, 2071); Townsend, common in dry alkaline soils, July 15 (2169 $\frac{1}{2}$).

Carex straminea Schk.

Montana: Manhattan, woods near the river, July 17 (2187).

Carex tenella Schk.

Montana: Silver Bow, about springs, July 8 (354, 2105).

Carex tolmiei Boott.

Colorado: Silver Plume, August 21 (2447).

Carex tolmiei subsessilis Bailey (Mem. Torr. Bot. Club, 1: 47, 1889).

Colorado: Silver Plume, common, along mountain brooks, altitude 12,000 feet, August 21 (704, 2467).

Carex trichocarpa aristata Bailey (Bot. Gaz., 10: 294, 1885).

Montana: Dillon, common in wet places, July 2 (2086); Deer Lodge, July 9 (2120); Helena, rare, ditches near railroad track, July 12 (2146).

Carex utriculata Boott.

Montana: Dillon, common in wet places, July 2 (2085).

Carex utriculata minor Boott.

Montana: Dillon, common in wet places, "nearly or quite var. *minor*" Bailey, July (2084); Deer Lodge, very common, in wet meadows near Mystic Lake, July 25 (485, 2237, 2241).

Carex variabilis Bailey (Mem. Torr. Bot. Club, 1: 18, 1889).

Montana: Bozeman, abundant in wet meadows, July 22 (461).

Carex variabilis Bailey (?)

Montana: Bozeman, abundant in meadows, and in places constituting the bulk of the hay, July 22 (448).

Idaho: Beaver Canyon, in meadows, common, June 26 (2046).

Carex variabilis elatior Bailey (Mem. Torr. Bot. Club, 1: 19, 1889).

Montana: Bozeman, common around Mystic Lake, July 25 (479, 2238, 2256).

Carex variabilis Bailey, var.

Colorado: Georgetown, rare, margin of Clear Lake, August 17 (647).

JUNCACEÆ.¹

The *Juncaceæ* or rushes, resemble grasses in their habit of growth, and are often confounded with them by farmers. They are nearly always found in wet places, where they sometimes enter largely into the wild hay. As they usually have wiry stems and leaves, they are of small economic value.

Juncus balticus Willd.

Colorado: Georgetown, common in meadows and along the borders of streams and lakes, August 17-20 (608, 648, 655, 2404).

Montana: Lima, along brooks and irrigating ditches, June 30 (2072), August 5 (2308); Deer Lodge, in very wet meadows, July 9 (2131); Melrose, in wet meadows, in some stations forming a small part of the hay, July 6 (345).

Juncus bufonius L.

Colorado: Idaho Springs, along the margins of a brook, August (743).

Utah: Echo, in Echo Canyon along a brook, growing with *Poa annua*, August 13 (2358).

Montana: Manhattan, along river banks and margins of ponds, July 17-19 (438, 2199).

Juncus longistylis Torr.

Colorado: Georgetown, in meadows, not common, August 17-20 (628, 2410); Boulder, along a brook at the entrance of a canyon, September 2 (760); Idaho Springs, occasional along brooks, August 26-28 (730).

Idaho: Beaver Canyon, frequent along the margins of mountain brooks, August 7 (582).

Montana: Manhattan, moist meadows and woodlands, July 17-19 (420, 2172, 2185); Bozeman, in meadows, July 22 (2212); Silver Bow, meadows, July 8 (2107).

Juncus mertensianus Bong.

Colorado: At the foot of Grays Peak, in wet places, scarce, August 21 (686).

Juncus nevadensis S. Wats.

Montana: Bozeman, in meadows, July 22 (2210, 2212½); Melrose, near the river, only a few specimens seen, August 1 (2292).

Juncus nodosus L.

Montana: Deer Lodge, along brooks, July 9 (2116); Manhattan, in wet meadows, July 17-19 (444, 2207); Melrose, near the river, rare, July 29 (2272).

Juncus rugelii Buchen.

Montana: Bozeman, sand bars on the east shore of Mystic Lake, July 25 (481, 2242).

Juncus subtriflorus (E. Mey.) Coville.

Colorado: Silver Plume, altitude 12,000 to 13,000 feet, August 21 (673, 700).

¹ Determined by Mr. F. V. Coville.

Juncus tenuis Willd.

Colorado: Boulder, occasional along brooks, September 2 (762).

Montana: Manhattan, in wet meadows, common, July 17-19 (441); Bozeman, in meadows with *Juncus neradensis*, July 22 (2211); Logan, wet river banks, common, July 27 (507); Townsend, banks of the Missouri River, July 15 (2149).

Juncus torreyi Coville.

Montana: Gallatin, in wet, sandy soil, common, July 29 (533).

Juncus xiphoides montanus Engelmann.

Colorado: Idaho Springs, along the margins of a mountain brook, scarce, July 26-28 (729).

Idaho: Beaver Canyon, along brooks, August 7 (583, 2335).

Montana: Lima, around a large spring, not common, June 30 (2066); Helena, in wet places along streams, and in such places forming a small part of the hay; Manhattan, in meadows near the Gallatin River, July 17-19 (2197).

Juncoides campestris (L.) Kuntze.

Montana: Bozeman, on the east side of Mystic Lake, rare, July 25 (2255).

Juncoides parviflora (Ehrh.) Coville.

Colorado: Georgetown, along small streams, rare, August 17-21 (2372); Silver Plume, common along streams, August 21 (2426).

POLYGONACEÆ.**Polygonum** sp.

Montana: Butte, common, July 31 (548). "I noticed cattle eating this in a pasture at Dillon" (Shear).

CHENOPODIACEÆ.**Eurotia lanata** L. (White Sage, Winter Fat).

Montana: Melrose, on the dry bench lands, common, July 6 (361, 2114). A valuable winter forage plant, especially for sheep.

APOCYNACEÆ.**Apocynum cannabinum** L. (Indian Hemp).

Montana: Logan, in low meadows along the river, common, July 27 (518). Said to be eaten by stock when cured with grass.

LEGUMINOSÆ.¹

Leguminosæ are the clovers, peas, beans, etc., including many of our best forage plants. They are particularly rich in nitrogen. Several native species are found to be of value in the Rocky Mountain region, especially the wild clovers (species of *Trifolium*).

Thermopsis montana Nutt.

Montana: Melrose, common in wet meadows, and said to be eaten by stock when in hay; it is perhaps worth investigation, August 1 (544).

Trifolium beckwithii Brewer; (Red Wild Clover).

Wyoming: Near Green River, rare, June 25 (2047).

Montana: Dillon, frequent in irrigated meadows, July 3 (338).

Growth often quite large, and the species is apparently worthy of cultivation.

Trifolium longipes Nutt. (White Wild Clover).

¹ Determined by Mr. C. L. Pollard.

Idaho: Beaver Canyon, common in wet meadows, June 26 (292, 2048). An excellent forage plant, worth cultivating, as it forms a dense sod and is quite luxuriant in its growth.

Astragalus adsurgens Pall.

Montana: Melrose, common in meadows, August 1 (535). Perhaps of some value for forage.

Astragalus bisulcatus A. Gray.

Montana: Dillon and throughout the Beaverhead Valley, in irrigated meadows, common, August 3 (551).

Astragalus diphyllus A. Gray.

Montana: Lima, on moist mountain sides, scarce, August 5 (558).

Astragalus flexuosus Dougl.

Idaho: Beaver Canyon, common in mountain woods, August 7 (577).

Astragalus hypoglottis L.

Montana: Melrose, in moist, sandy meadows, common, August 1 (539).

Astragalus mortoni Nutt.

Colorado: Georgetown, in meadows, frequent, August (629, 630).

Astragalus sp.

Idaho: Beaver Canyon, on the mountains, frequent, August 7 (579).

Oxytropis deflexa DC.

Colorado: Georgetown, in moist, gravelly soils, common, August (658).

Oxytropis splendens Dougl.

Colorado: Georgetown, in meadows, common, August (634).

Vicia americana linearis S. Wats.

Montana: Deer Lodge, in meadows, common, July 9 (362, 2118).

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